

**BROWN
& SHARPE**
**Machinists'
Tools**

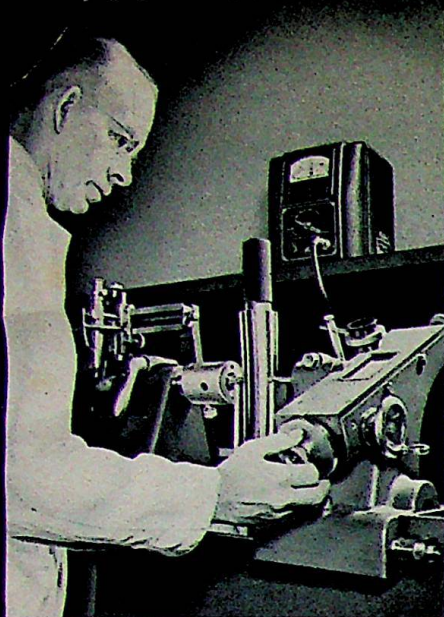
*The Choice of
Skilled Craftsmen*



CATALOG 135

CHANDLER & FARQUHAR CO., INC.
900 Commonwealth Ave.
LONGwood 6-7800 Boston 15, Mass.

BROWN & SHARPE TOOLS



This measuring machine is checking electronically to a fine degree of precision the dimensions of the taper plug gage. Measurements are taken easily and positively from the widely spaced amplifier dial graduations.

Miracles of Precision

To make good tools, tools unvaryingly accurate and reliable, requires experience, skill, knowledge of materials, modern equipment and craftsmen instilled with the spirit of accuracy—who live it day after day.

Here at Brown & Sharpe are used the most modern methods for testing the alignment of Vernier and Micrometer assemblies, for producing a micrometer screw accurate to almost unbelievable limits and for maintaining the highest qualities in design and construction of the entire line.

Here in a Gage Laboratory, maintained at 68°F with a relative humidity of 55%, highly specialized, sensitive machines inspect standards used in controlling the accuracy of our tools to limits as small as millionths.

In another department similarly controlled Johansson Gage Blocks are produced with a degree of accuracy of a few millionths per inch—Blocks that are fitting companions in quality to Brown & Sharpe Tools.

The Plant That Provides Them

Any plant reflects the character of the products it produces and below you see the largest machine shop in the world devoted to the manufacture of precision machines, tools and associated equipment. This plant has grown big because of the high esteem in which users

hold its products, and the consequent ever increasing demand for them by tool users the world over. It is living proof to experienced tool users as well as to beginners of their wisdom in selecting Brown & Sharpe Tools for their every need.

Founded in 1833, over one hundred years ago, by David Brown and his son Joseph R. Brown as a clock and watch business, it was just a step from the manufacture of precise watch and clock parts to verniers, scales, micrometers and other precision products.

Following retirement of David Brown, Lucian Sharpe became Joseph R. Brown's partner in 1853 and the Brown & Sharpe Mfg. Co. was incorporated in 1868.

Two years before this the two partners had been joined by Samuel Darling who had begun the manufacture of steel rules a few years after Joseph R. Brown and Lucian Sharpe began their manufacture, and the partnership of Darling, Brown & Sharpe continued until the purchase of Mr. Darling's interest in 1892.

Throughout these early years and continuing to the present, inventions of many new products were given the world by this company—products that brought a new destiny to America's industries and gave impetus to the progress in the manufacture of interchangeable parts.

In 1850, Mr. Brown invented a linear dividing engine, the first automatic machine for graduating rules in America, and one year later the first Vernier Caliper was introduced bringing measurements in "thousandths" within reach of a machinist.

In 1856, Lucian Sharpe developed the system of wire gages adopted as the American Wire Gage by the Waterbury Brass Association in 1857.

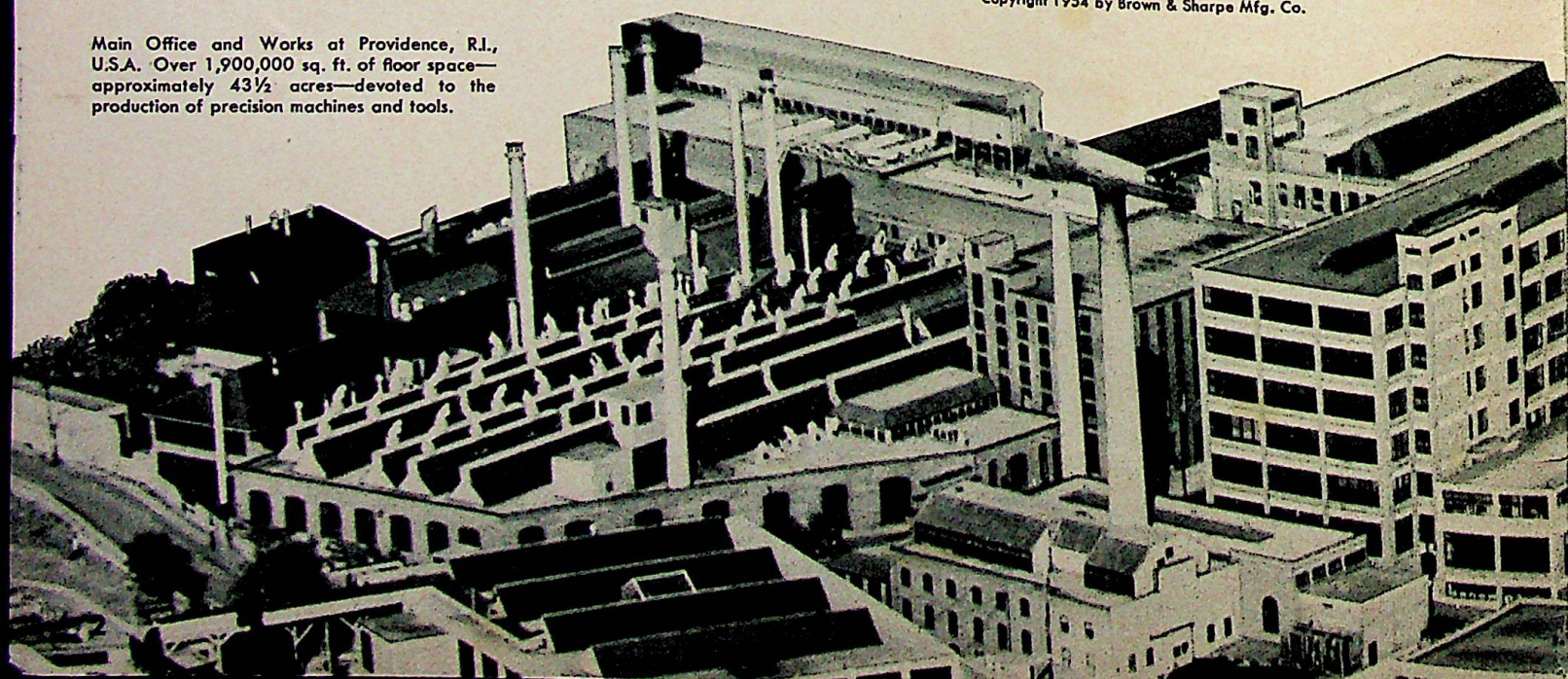
In 1867, the first practical Micrometer Caliper was produced and, throughout the years from Brown & Sharpe have flowed improvements and inventions, the clamp ring, the ten-thousandths graduation and the other modern features of today's micrometers.

In addition to these and other tools, from this famous company came the inventions of the Universal Milling and Grinding Machines and the development of the Brown & Sharpe Automatic Screw Machine which contributes much to the economical manufacture of small parts today.

It is thus understandable that a factory, devoted as is this one almost exclusively to precision manufacture, would give you the machinists' tools that are the treasures of machinist, inspector or toolmaker—the tools shown here in your catalog.

Copyright 1954 by Brown & Sharpe Mfg. Co.

Main Office and Works at Providence, R.I., U.S.A. Over 1,900,000 sq. ft. of floor space—approximately 43½ acres—devoted to the production of precision machines and tools.



"The Choice of Skilled Craftsmen the World Over"

Standards

Here at Brown & Sharpe where we make Johansson Gage Blocks and other precision instruments, only our own standards are used and these are checked frequently with those of the United States Bureau of Standards.

Patents

Many of the tools in this catalog are protected by issued or pending United States patents and/or foreign patents.

Metric Measure Tools

Tool users working with Metric Measurements should write for complete Machinists' Tools Catalog No. 35M as many styles are made also graduated for Metric Measure.

Omitted Listings

In this illustrated catalog variations of some listings are omitted. For example: larger micrometers can be furnished with or without standards and sets with or without cases and standards. Similar variations are omitted with other tools, also as noted in the listing. When a complete listing is required Catalog No. 35M will be sent on request.

Purchasing Tools

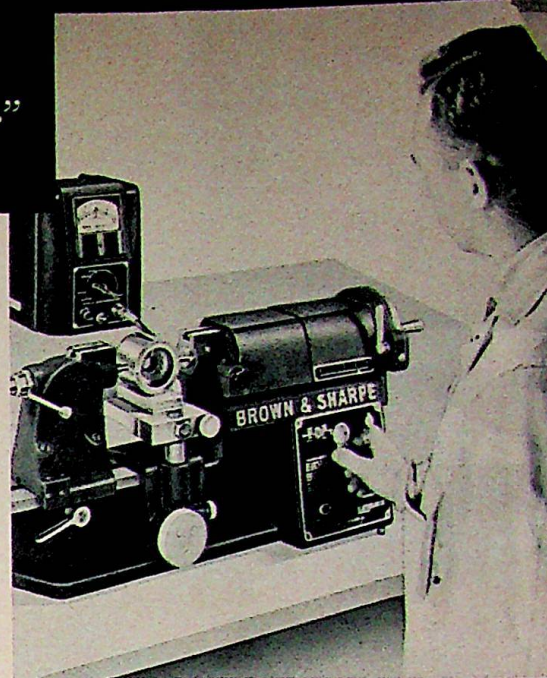
Stocks of Brown & Sharpe Tools are carried by hardware stores and industrial distributors who not only provide immediate delivery of most items but save customers the inconvenience of correspondence and frequently delays in ordering tools not in the dealers' stock. Whenever possible buy from your dealer. In places remote from a dealer, tools may be purchased directly from our factory. Where tools cannot be purchased from dealers we pay transportation charges to any place in the United States and Canada and will ship upon receipt of remittance in New York funds for the price of the tools. We do not pay duty on shipments outside the United States.

Prices

Prices are subject to change without notice. In addition to stated prices, buyer shall pay the seller an amount equal to any sales, use, occupation or excise taxes which the seller may pay in respect to a sale. Prices F.O.B. Providence, R.I.

Order by Ordering Number

Always use the Ordering Number preceding the Price to identify the item wanted.



Measurements as close as .00001" are made easily on this measuring machine with an 18,000 to 1 magnification—one of the many devices that maintain the high degree of precision in Brown & Sharpe Tools.

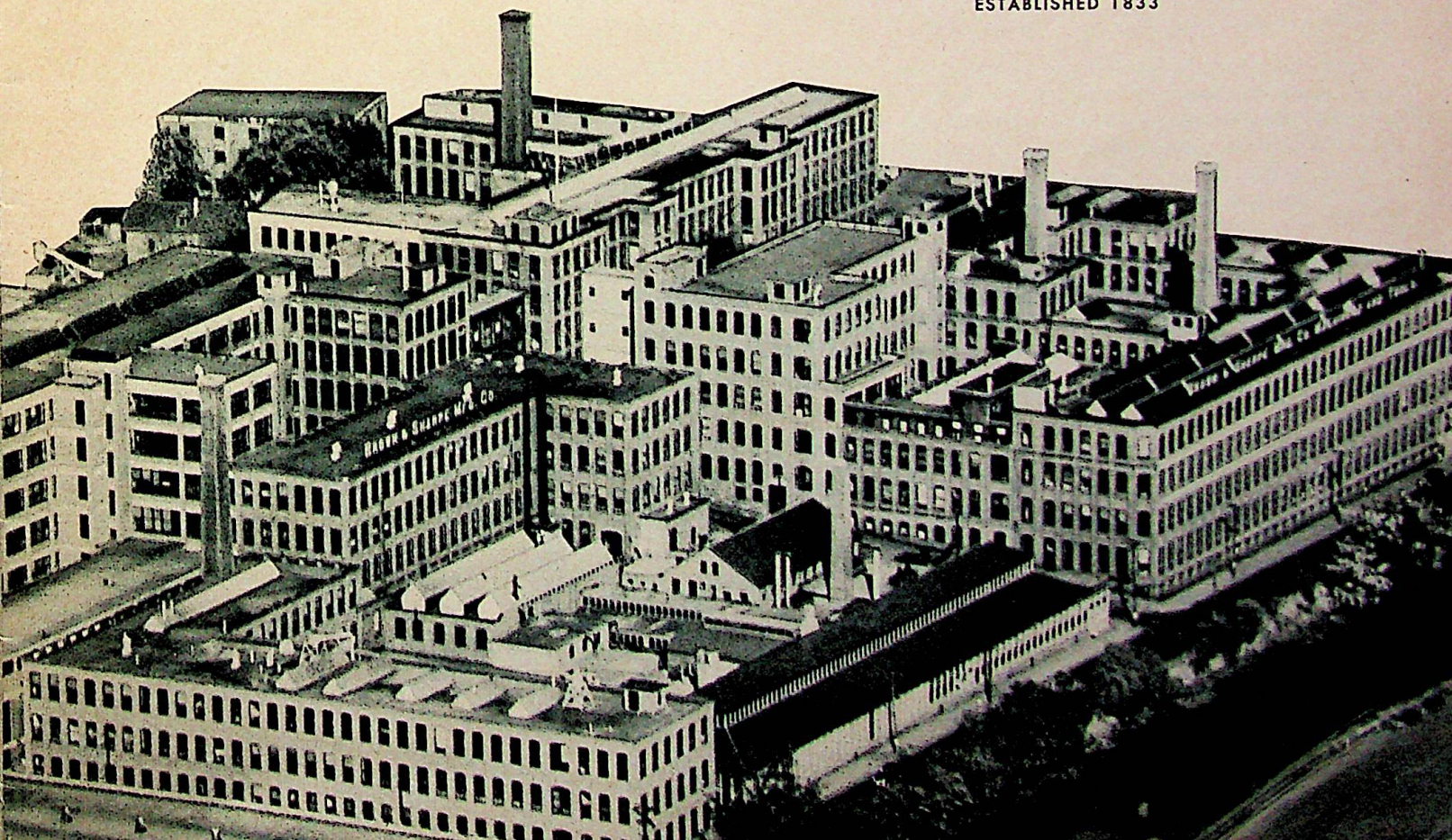


Trade Mark
Reg. U.S. Pat. Off. and Foreign Countries

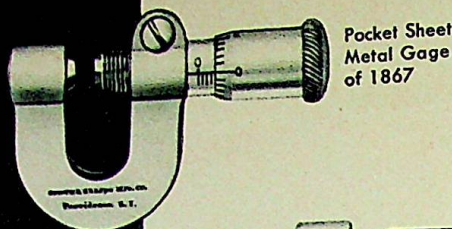
BROWN & SHARPE MFG. CO.

Providence 1, R. I., U. S. A.

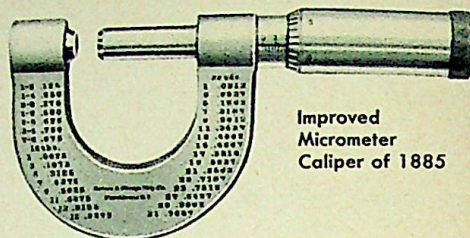
ESTABLISHED 1833



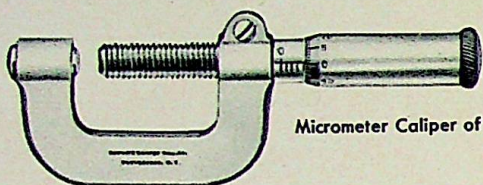
The First Practical Micrometer was a BROWN & SHARPE TOOL



Pocket Sheet
Metal Gage
of 1867



Improved
Micrometer
Caliper of 1885



Micrometer Caliper of 1877

We must go back more than one hundred years to find the prototype of the Micrometer of today in a tool known as "Système Palmer", patented in France in 1848. Messrs. J. R. Brown and Lucian Sharpe saw this tool during their visit to the Paris Exposition in 1867 and were impressed with the fact that it might help to solve a problem which had come to their attention earlier that year.

Before their departure for Europe, the Bridgeport Brass Company, who had had a shipment returned as "out of gage"

and had found that no two of the three standard gages then in use agreed on the brass in question, had sent a model and sketch of a proposed measuring tool to J. R. Brown and Sharpe for experimental work. The tool was not of value commercially, as it could not be read easily, but there was evidently a need for better means of measuring sheet metal.

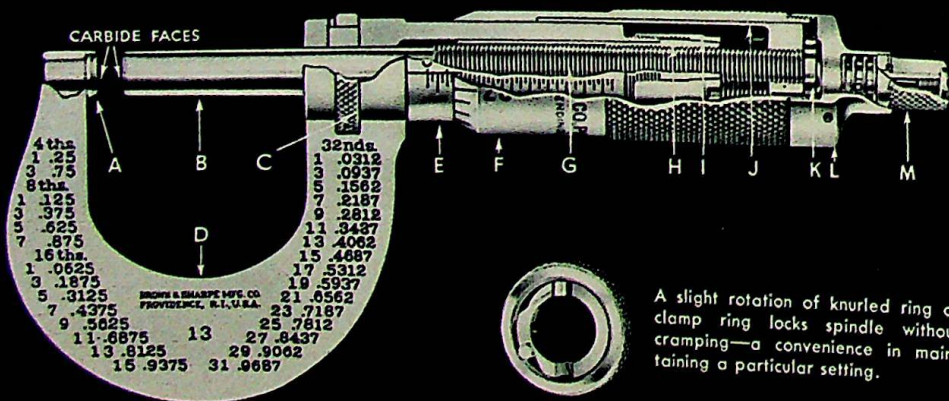
Upon their return from Paris, Messrs. Brown and Sharpe introduced the "Pocket Sheet Metal Gage", adopting a system of graduations similar to that of the Palmer tool and adding means of compensating for wear of measuring surfaces and screw. This was the first practical micrometer and it was so well made that even today specimens of it will be found in use.

From this beginning and from ideas worked out in its own shops and through acquired patents, the Brown & Sharpe Mfg. Co. has increased its line to include about two hundred and fifty different Micrometer Calipers designed to meet all ordinary shop requirements.

The Principle of the Micrometer Caliper

The basis of the Micrometer Caliper is an accurate screw G, which can be revolved in a fixed nut H to vary the opening between the two measuring faces, one at the end of the screw-spindle B and the other on the anvil A. The graduations on the barrel E and thimble F indicate precisely the position of the screw and the amount of the opening between the measuring

faces. The thimble rotates with the screw-spindle and travels along the barrel. The graduations on the barrel conform to the pitch of the measuring screw, one line for each revolution. The graduations on the beveled edge of the thimble accurately subdivide each revolution of the screw so that readings may be taken in units, usually of .001".



The Parts of a Micrometer Caliper

- A — Anvil
- B — Spindle
- C — Clamp Ring
- D — Frame
- E — Barrel
- F — Thimble
- G — Measuring Screw
- H — Fixed Nut
- I — Adjusting Nut for Thread Wear
- J — Thimble Sleeve
- K — Lock Nut for Thimble Sleeve and Measuring Screw
- L — Thimble Cap
- M — Ratchet Stop

A slight rotation of knurled ring of clamp ring locks spindle without cramping—a convenience in maintaining a particular setting.

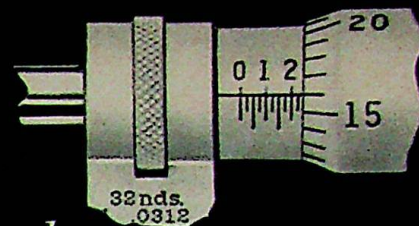
BROWN & SHARPE MICROMETERS

are easier to read—

large jet black figures and

graduations, non-glare dull chrome finish, and

larger diameter barrel, wider divisions



How to Read Micrometers Graduated to Thousandths of an Inch

The micrometer screw has 40 threads per inch. This means that one complete and exact revolution of the micrometer screw moves the contact face at the end of the spindle either away from or towards the face of the anvil exactly .025".

The lines on the barrel conform to the pitch of the micrometer screw, each line indicating .025" and each fourth line being numbered 1, 2, 3, etc. to indicate hundreds of thousandths—.100", .200", .300", etc. The beveled edge of the thimble is graduated into 25 parts, each line indicating .001"—1/25 of the .025" covered by one complete and exact revolution of the thimble. Every fifth line on the thimble is numbered.

To read a measurement in thousandths of an inch: To the number of hundreds of thousandths of an inch indicated

by the highest figure visible on the barrel, add .025" for each line visible between that number and the thimble edge, and to this total add the number of the line on the thimble which coincides with or has passed the long parallel or axial line on the barrel.

Example

Highest figure visible on barrel.....	2 = .200"
Lines visible between the number 2 and thimble edge.....	1 = .025"
Line on thimble which coincides with or has passed long line on barrel.....	16 = .016"
Reading of Measurement.....	Total .241"

How to Read Micrometers Graduated to Ten-Thousandths of an Inch

Readings in .0001" are obtained by a Vernier on the barrel of the micrometer, see *illustrations below.

Example

In left-hand line illustration, there are no ten-thousandths to add as the zero lines on Vernier coincide with lines on thimble. Reading = .4690"

The zero lines on the Vernier and thimble coincide when the reading is exact in thousandths and the differences between lines on thimble and lines on Vernier at 1, 2, 3, etc. = .0001", .0002", .0003", etc. Thus as the 1, 2, 3, etc. Vernier line coincides with a thimble line, the thimble has moved past the

exact setting 1, 2, 3, etc., ten-thousandths of an inch.

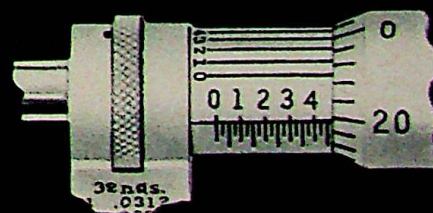
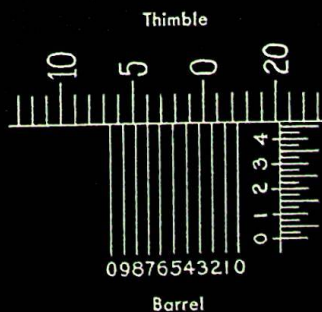
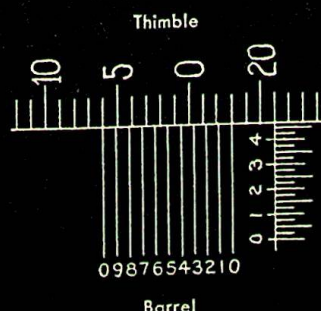
To read: First obtain reading in thousandths and add to this the ten-thousandths indicated by the coinciding lines of the Vernier and the thimble.

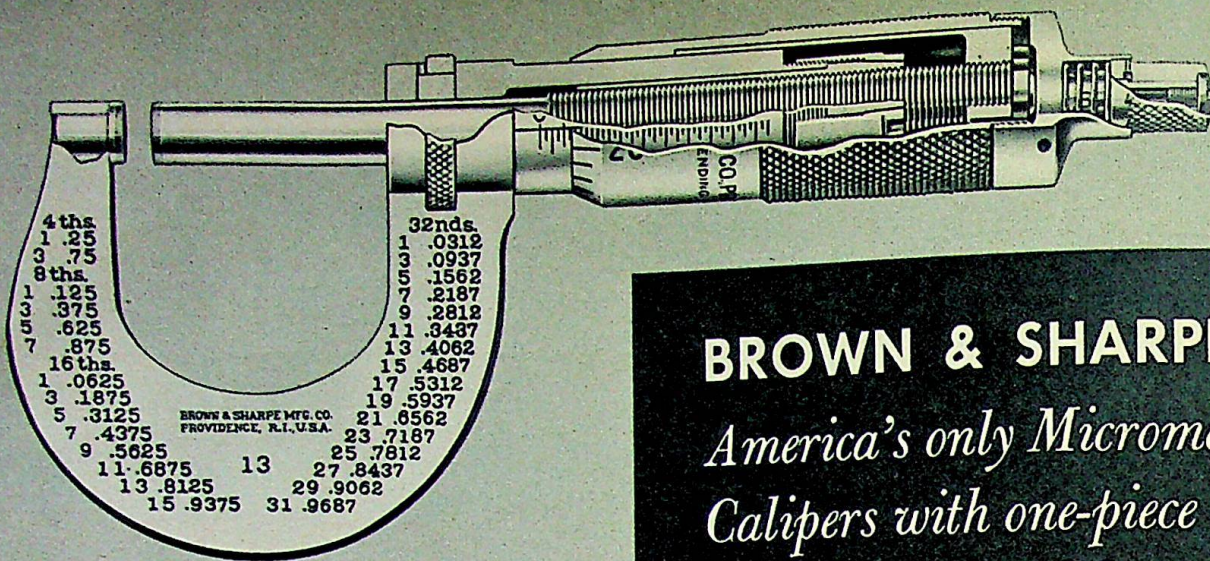
Example

In right-hand line illustration, the 7th graduation on the Vernier, indicating that 7/10,000" should be added to the thousandths reading, coincides with line on thimble. .4690" + .0007" = .4697"

Reading = .4697"

*Micrometer Calipers 233RS and 245 read .0001" directly.





BROWN & SHARPE

*America's only Micrometer
Calipers with one-piece Stainless
Steel Spindle and Screw*

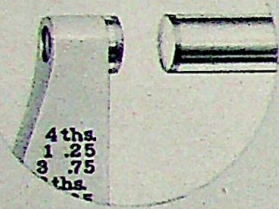
Long-Wearing Carbide Faces

Distinctive Features of Brown & Sharpe Micrometers

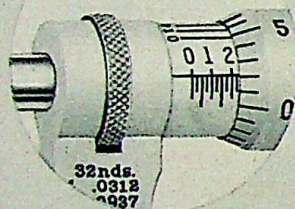
These new Brown & Sharpe Micrometers bring many desirable features for making precision measuring easier, accuracy surer and the micrometers longer lived. They are America's only micrometer with one-piece stainless steel spindle and screw.

The dull chrome finish is non-glaring and, with the black graduations and figures, makes reading easier and surer, and the large diameter thimble makes possible wider divisions—greater magnification—with correspondingly greater accuracy. The decimal equivalents stamped on the frames of many models include 64ths, 32nds, 16ths and 8ths. All models except 216 and 217 have the dull chrome, rust resistant finish.

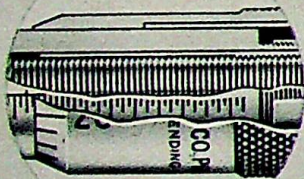
These new micrometers represent greater value and finest quality and again demonstrate Brown & Sharpe leadership in offering to users the finest in precision products.



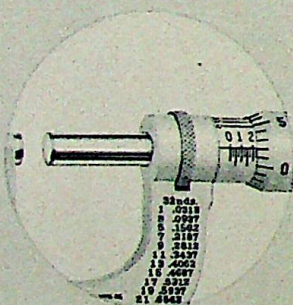
Carbide measuring faces on many models



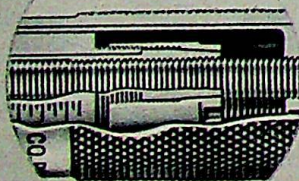
Large diameter thimble, wider divisions, greater magnification



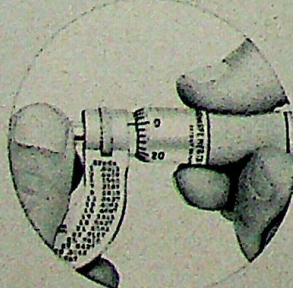
One-piece stainless steel spindle and screw, hardened and ground threads on many models



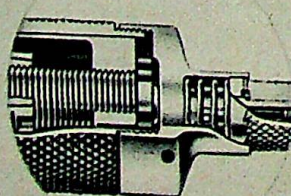
Rust resistant dull chrome finish, black graduations



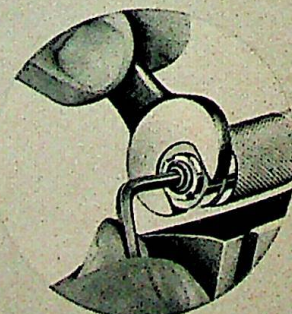
Sliding taper thread adjustment—sensitive—accurate



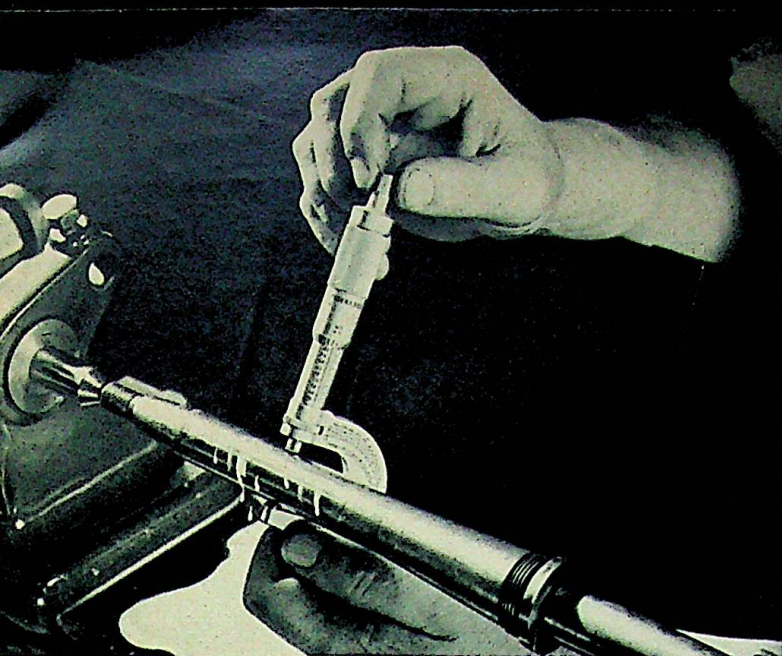
Adjustable thimble—easy, convenient for setting zero



Thimble locked to screw



Thimble adjusted longitudinally on screw



The new Brown & Sharpe Micrometers with carbide measuring faces, stainless steel spindle and screw with rust resistant finish, stand up where the going is rough, such as here on a grinding machine where they are subject to abrasive and moisture.

5 and 5RS Micrometer Calipers 0 to 1/2" by .001"

Have stainless steel spindle and screw, clamp ring and carbide measuring faces.

5	No. 599-5-100	\$15.50
5RS (Has ratchet stop)	No. 599-5-120	16.25

6 and 6RS Micrometer Calipers

Similar to 5 and 5RS but read by .0001" and do not have clamp ring.

6	No. 599-6-100	\$18.00
6RS (Has ratchet stop)	No. 599-6-120	18.75

8 and 8RS Micrometer Calipers 0 to 1" by .001"

Have hardened and ground threads and clamp ring.

8	No. 599-8-100	\$15.50
8RS (Has ratchet stop)	No. 599-8-120	16.25

11 and 11RS Micrometer Calipers 0 to 1" by .001"

Have stainless steel spindle and screw, enamel I section frame and carbide measuring faces. Anvil projects 3/16".

11	No. 599-11-100	\$12.25
11RS (Has ratchet stop)	No. 599-11-120	13.00

12 and 12RS Micrometer Calipers

Similar to 13 and 13RS but read by .001".

12	No. 599-12-100	\$17.00
12RS (Has ratchet stop)	No. 599-12-120	17.75

13 and 13RS Micrometer Calipers 0 to 1" by .0001"

Have stainless steel spindle and screw, clamp ring and carbide measuring faces. Narrow anvil end for measuring deep in slots.

13	No. 599-13-100	\$19.50
13RS (Has ratchet stop)	No. 599-13-120	20.25

17 and 17RS Micrometer Calipers

Similar to 8 and 8RS but have stainless steel spindle and screw and a clamp screw instead of clamp ring. Clamp screw can be used on either side of frame. For gaging hot metal.

17	No. 599-17-100	\$19.25
17RS (Has ratchet stop)	No. 599-17-120	20.00

17 Micrometer Caliper with Wooden Handle

Similar to 17 but has large winged spindle lock instead of clamp screw. Wooden handle keeps hand at distance from hot metal.

No. 599-17-108	\$22.00
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19 and 19RS Micrometer Calipers 0 to 1" by .001"

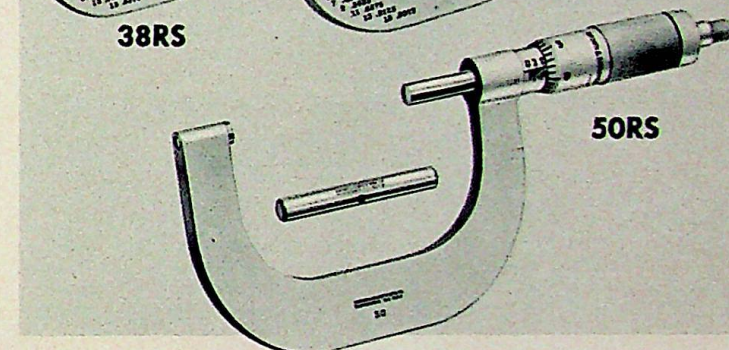
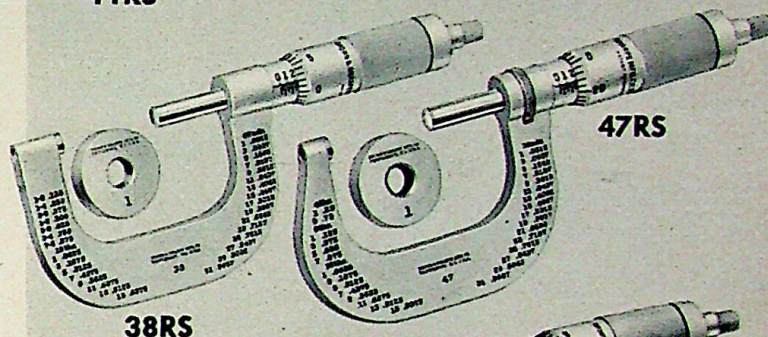
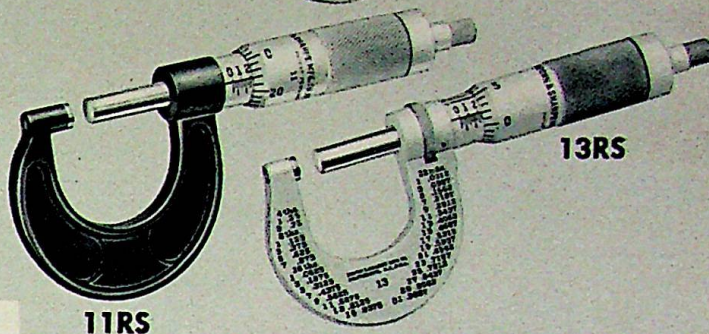
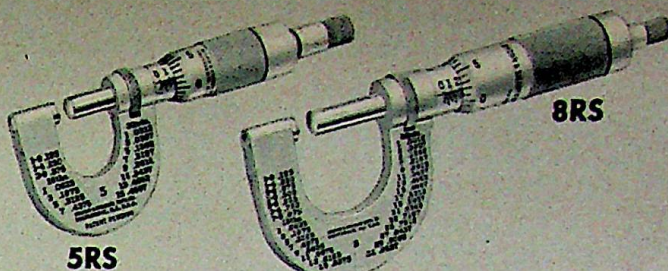
Similar to 8 and 8RS but do not have clamp ring.

19	No. 599-19-100	\$14.25
19RS (Has ratchet stop)	No. 599-19-120	15.00

38 and 38RS Micrometer Calipers 1" to 2" by .001"

With standard. Have hardened and ground threads.

38	No. 599-38-100	\$16.00
38RS (Has ratchet stop)	No. 599-38-120	16.75



47 and 47RS Micrometer Calipers 1" to 2" by .001"

Have stainless steel spindle and screw, clamp ring and carbide measuring faces. Narrow anvil ends. With standard.

47	No. 599-47-100	\$18.75
47RS (Has ratchet stop)	No. 599-47-120	19.50

48 and 48RS Micrometer Calipers

Similar to 47 and 47RS but read by .0001".

48	No. 599-48-100	\$21.25
48RS (Has ratchet stop)	No. 599-48-120	22.00

50 and 50RS Micrometer Calipers 2" to 3" by .001"

With standard. Have hardened and ground threads.

*50	No. 599-50-100	\$20.75
*50RS (Has ratchet stop)	No. 599-50-120	21.50

52 and 52RS Micrometer Calipers

Similar to 50 and 50RS but have stainless steel spindle and screw, clamp ring and carbide measuring faces.

*52	No. 599-52-100	\$26.50
*52RS (Has ratchet stop)	No. 599-52-120	27.25

53 and 53RS Micrometer Calipers

Similar to 52 and 52RS but read by .0001".

*53	No. 599-53-100	\$29.00
*53RS (Has ratchet stop)	No. 599-53-120	29.75

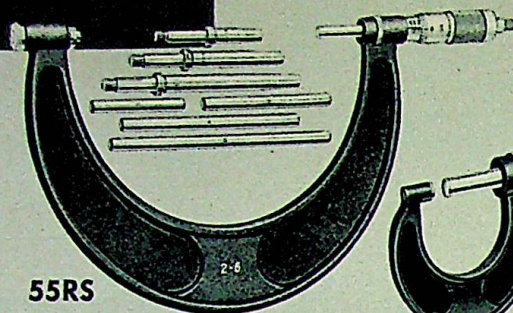
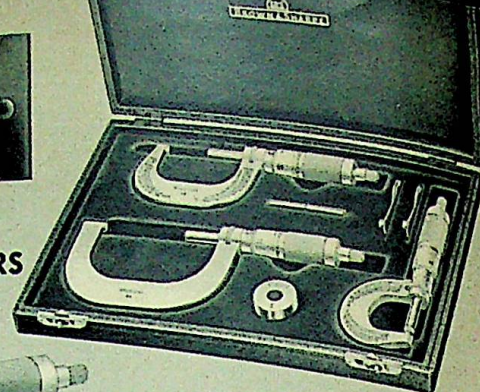
*Tools also available without standard.

For cases for Micrometer Calipers see page 8.

There's a **BROWN & SHARPE**
MICROMETER CALIPER
for Every Need



Soft leather case



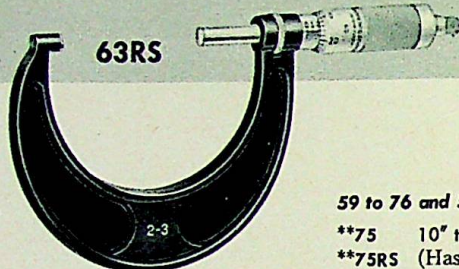
55RS

131RS

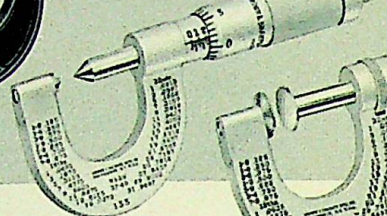


59RS

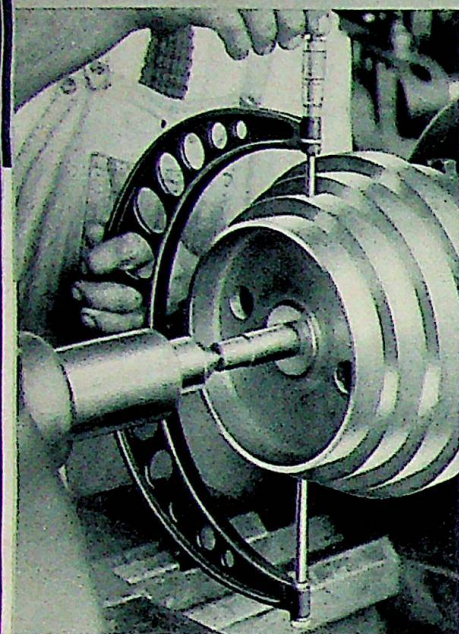
155RS



63RS



215RS



In using large micrometer caliper, place the fingers in the holes in the frame to procure a firm grip in making measurements.

54 and 54RS Micrometer Calipers 0 to 4" by .001"

Have 3 standards and clamp ring. Similar to 55 and 55RS but have 0 to 4" range. Furnished in finished wooden case.

*54	No. 599-54-100	\$37.25
*54RS (Has ratchet stop)	No. 599-54-120	38.00

55 and 55RS Micrometer Calipers 2" to 6" by .001"

Have 4 standards and clamp ring. Enamelled I section frame has interchangeable anvils providing extended range of measurement. Particularly suited to automotive work. Furnished in finished wooden case.

*55	No. 599-55-100	\$43.00
*55RS (Has ratchet stop)	No. 599-55-120	43.75

57 and 57RS Micrometer Calipers 6" to 12" by .001"

Have 6 standards and clamp ring. Similar to 55 and 55RS but have holes in frame for lightness and finger grip. For accurate measurements from 6" to 12" where use does not warrant investment in six separate micrometers. Furnished in finished wooden case.

*57	No. 599-57-100	\$86.50
*57RS (Has ratchet stop)	No. 599-57-120	87.25

*Tools also available without standards.

59 to 76 and 59RS to 76RS Micrometer Calipers

0 to 12" by .001"

Have stainless steel spindle and screw, enamelled I section frame, carbide measuring faces and clamp ring. Anvil projects above the frame for convenience in measuring.

59	0 to 1"	No. 599-59-100	\$13.50
59RS (Has ratchet stop)	0 to 1"	No. 599-59-120	14.25
*61	1" to 2"	No. 599-61-100	15.00
*61RS (Has ratchet stop)	1" to 2"	No. 599-61-120	15.75
*63	2" to 3"	No. 599-63-100	18.75
*63RS (Has ratchet stop)	2" to 3"	No. 599-63-120	19.50
*65	3" to 4"	No. 599-65-100	21.50
*65RS (Has ratchet stop)	3" to 4"	No. 599-65-120	22.25
*67	4" to 5"	No. 599-67-100	22.50
*67RS (Has ratchet stop)	4" to 5"	No. 599-67-120	23.25
*69	5" to 6"	No. 599-69-100	23.50
*69RS (Has ratchet stop)	5" to 6"	No. 599-69-120	24.25
*71	6" to 7"	No. 599-71-100	24.50
*71RS (Has ratchet stop)	6" to 7"	No. 599-71-120	25.25
*72	7" to 8"	No. 599-72-100	26.00
*72RS (Has ratchet stop)	7" to 8"	No. 599-72-120	26.75
*73	8" to 9"	No. 599-73-100	27.50
*73RS (Has ratchet stop)	8" to 9"	No. 599-73-120	28.25
*74	9" to 10"	No. 599-74-100	29.00
*74RS (Has ratchet stop)	9" to 10"	No. 599-74-120	29.75

59 to 76 and 59RS to 76RS Micrometer Calipers, Continued

*75	10" to 11"	No. 599-75-100	\$30.50
*75RS (Has ratchet stop)	10" to 11"	No. 599-75-120	31.25
*76	11" to 12"	No. 599-76-100	32.00
*76RS (Has ratchet stop)	11" to 12"	No. 599-76-120	32.75

*Tools also available with standards

Micrometer Caliper Cases

Add to convenience and protect tools against damage.

For 1" Micrometers and 215, 215RS	No. 599-11-9999	\$2.25
For 2" Micrometers—38, 38RS, 47, 47RS, 48, 48RS	No. 599-40-9999	\$2.75
For 3" Micrometers—50, 50RS, 52, 52RS, 53, 53RS, 216, 217	No. 599-50-9999	\$4.50

Cases for other micrometer calipers also available.

Soft Leather Cases

For 1/2" Micrometers except 232, 232RS	No. 599-4-9999	\$7.00
For 1" Micrometers except 237, 237RS	No. 599-10-9999	.70
For 2" Micrometers except 216	No. 599-38-9999	.70

Micrometer Caliper Sets

Convenient sets furnished in case with standards †

130	0 to 3" by .001" 19, 38 and 50 Micrometers	No. 599-130-100	\$57.00
130RS	(Has ratchet stops) 0 to 3" by .001" 19RS, 38RS and 50RS Micrometers	No. 599-130-120	\$59.25
131	0 to 3" by .001" 12, 47 and 52 Micrometers	No. 599-131-100	\$68.25
131RS	(Has ratchet stops) 0 to 3" by .001" 12RS, 47RS, and 52RS Micrometers	No. 599-131-120	\$70.50
132	0 to 3" by .0001" 13, 48 and 53 Micrometers	No. 599-132-100	\$75.75
132RS	(Has ratchet stops) 0 to 3" by .0001" 13RS, 48RS and 53 RS Micrometers	No. 599-132-120	\$78.00
133	0 to 3" by .001" 59, 61 and 63 Micrometers	No. 599-133-100	\$57.25
133RS	(Has ratchet stops) 0 to 3" by .001" 59RS, 61RS and 63RS Micrometers	No. 599-133-120	\$59.50
135	0 to 6" by .001" 59, 61, 63, 65, 67 and 69 Micrometers	No. 599-135-100	\$137.75
135RS	(Has ratchet stops) 0 to 6" by .001" 59RS, 61RS, 63RS, 65RS, 67RS and 69RS Micrometers	No. 599-135-120	\$142.25
137	6" to 12" by .001" 71, 72, 73, 74, 75 and 76 Micrometers	No. 599-137-100	\$229.50
137RS	(Has ratchet stops) 6" to 12" by .001" 71RS, 72RS, 73RS, 74RS, 75RS and 76RS Micrometers	No. 599-137-120	\$234.00
138	0 to 12" by .001" 59, 61, 63, 65, 67, 69, 71, 72, 73, 74, 75 and 76 Micrometers	No. 599-138-100	\$361.50
138RS	(Has ratchet stops) 0 to 12" by .001" 59RS, 61RS, 63RS, 65RS, 67RS, 69RS, 71RS, 72RS, 73RS, 74RS, 75RS and 76RS Micrometers	No. 599-138-120	\$370.50

†Micrometer Caliper Sets 130 to 138, can be furnished without cases and without standards.

218

237RS

233RS

226

Rounded anvil
used on 225 and
228.

71RS

Micrometer caliper case

232RS

228

225RS

152 to 155 and 152RS to 155RS Screw Thread Micrometer Calipers

Pitch diameters 0 to 1" by .001"

End of spindle is pointed. Anvil has accurate V and is free to rotate. Measure Unified and American Threads as well as older Am. National and U. S. Std.

These tools are fast and convenient for measuring threads. However, when adjusted to read zero with thimble and anvil together, the readings are slightly distorted, the distortion depending upon the helix angle of the thread. To obtain accurate readings the thread micrometer should be set to standard thread plug of the same pitch and diameter as the thread to be measured. When set in this manner the tool does not read exactly zero when anvil and thimble are together.

152	Measures 8 to 13 thds. per in.	No. 599-152-114	\$21.25
152RS	(Has ratchet stop) Measures 8 to 13 thds. per in.	No. 599-152-134	22.00
153	Measures 14 to 20 thds. per in.	No. 599-153-114	21.25
153RS	(Has ratchet stop) Measures 14 to 20 thds. per in.	No. 599-153-134	22.00
154	Measures 22 to 30 thds. per in.	No. 599-154-114	21.25
154RS	(Has ratchet stop) Measures 22 to 30 thds. per in.	No. 599-154-134	22.00
155	Measures 32 to 40 thds. per in.	No. 599-155-114	21.25
155RS	(Has ratchet stop) Measures 32 to 40 thds. per in.	No. 599-155-134	22.00

215 and 215RS Micrometer Calipers 0 to 1" by .001"

Have clamp rings. Disk type measuring surfaces for measuring form tools. Disks are $\frac{1}{2}$ " diameter, $\frac{1}{16}$ " thick in center and .015" thick at edge.

215	No. 599-215-100	\$29.25
215RS (Has ratchet stop)	No. 599-215-120	30.00

216 to 218 Micrometer Calipers 1" to 3½" by .001"

Enameled I section frame. 216 and 217 have bright frames. Blade type measuring surfaces for measuring forming tools. Blades are .030" thick, measure to $\frac{1}{32}$ " depth.

216	1" to 2"	No. 599-216	\$70.00
217	1½" to 2½"	No. 599-217	70.00
218	2½" to 3½"	No. 599-218	70.00

225 and 225RS Micrometer Calipers 0 to ½" by .001"

For measuring thickness of tubing. Frame cut away so rounded anvil enters tubing as small as $\frac{5}{16}$ " inside diameter.

225	No. 599-225-100	\$15.50
225RS (Has ratchet stop)	No. 599-225-120	16.25

226 Ball Attachment

For measuring curved surfaces. Snaps instantly either on anvil or spindle end of micrometers having spindle .250" diameter. Subtract .250" from actual caliper reading.

No. 599-226 \$1.00

228 Micrometer Caliper 0 to 1" by .001"

For measuring thickness of tubing. Enameled I section frame. Frame cut away so rounded anvil enters tubing as small as $\frac{1}{16}$ " inside diameter.

No. 599-228-100 \$11.75

230RS Paper Gage Micrometer Caliper 0 to ¾" by .001" (Has ratchet stop)

Disks $\frac{1}{2}$ " diameter. Disk on anvil floats. For gaging paper, etc.

No. 599-230-120 \$20.00

232 and 232RS Paper Gage Micrometer Calipers 0 to ¾" by .001"

Disks, $\frac{1}{2}$ " diameter. Disk on anvil floats. Enameled I section frame with deep opening permits measurements 2" from edge of material.

232	No. 599-232-100	\$25.00
232RS (Has ratchet stop)	No. 599-232-120	25.75
Case	No. 599-232-9999	3.75

233RS Micrometer Caliper 0 to ½" by .0001"

Has stainless steel spindle and screw, carbide measuring faces and ratchet stop. For direct reading ten-thousandths measurements. Can be used on a bench.

No. 599-233-120 \$60.00

237 and 237RS Micrometer Calipers 0 to 1" by .001"

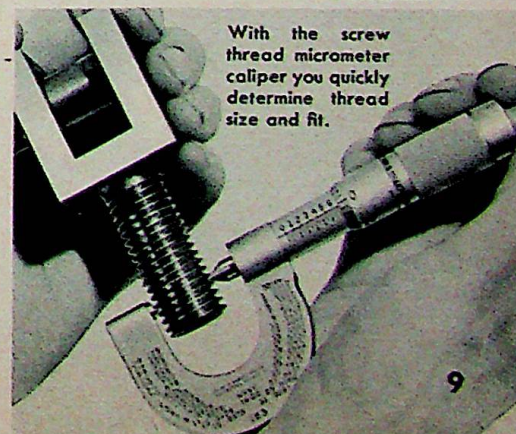
For gaging sheet metal. Enameled I section frame with deep opening permits measurements 3" in from edge of work. Have stainless steel spindle and screw and carbide measuring faces.

237	No. 599-237-100	\$22.25
237RS (Has ratchet stop)	No. 599-237-120	23.00
Case	No. 599-237-9999	3.75

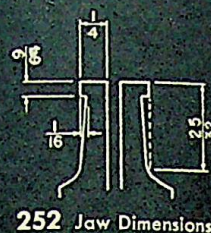
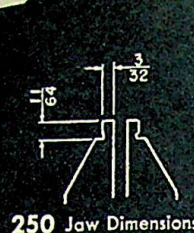
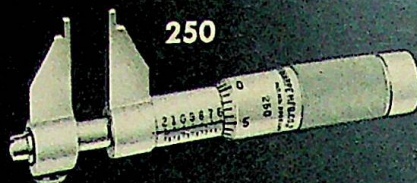
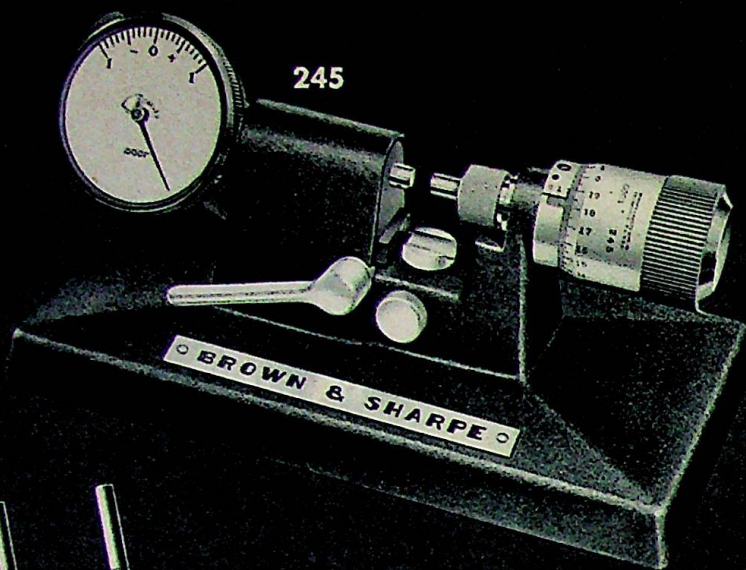
The narrow anvil end of 12, 13, 47, and 48 type micrometers permits measurements deep in narrow slots and keyways and other places inaccessible to conventional frames.



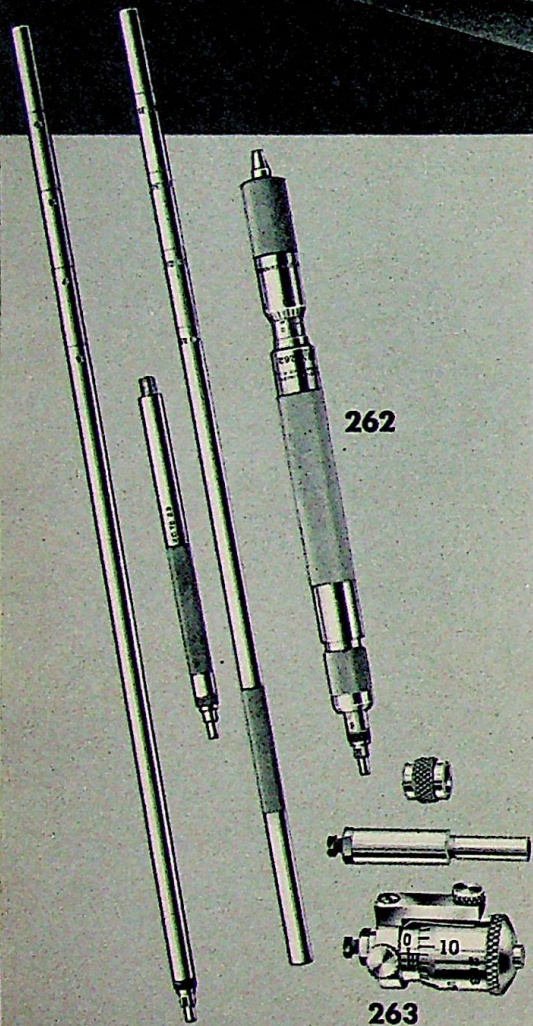
54 and 55 type micrometers are almost automotive shop "musts". Their ranges cover wrist pins, bearings, pistons and most other automotive parts.



With the screw thread micrometer caliper you quickly determine thread size and fit.



It's Easy to do the **HARD JOBS**



245 Indicating Bench Micrometer 0 to 1/2" by .0001"

Measures by .0001" directly from micrometer thimble or directly from dial gage with micrometer set to nearest .001". Also, serves as a comparator. Retractor lever withdraws anvil for repeat measurements. Adjustable measuring pressure, 8 ozs. to 2 lbs. Carbide measuring faces. Furnished in finished wooden case.

No. 599-245-6 \$190.00

250 Inside Micrometer Caliper .200" to 1.200" by .001"

For small internal measurements. Has stainless steel screw with hardened and ground threads. Has clamp screw.

Case	No. 599-250	\$29.00
	No. 599-250-9999	2.30

252 Inside Micrometer Caliper 1/2" to 1 1/2" by .001"

Similar to 250 except for range and shape of jaws (see illustration above) which permit measuring over a flange or shoulder.

Case	No. 599-252	\$31.00
	No. 599-250-9999	2.30

262 Inside Micrometer 8" to 36" by .001"

Has 7 measuring rods and extension. Measuring rods are interchangeable in holder which has thimble and micrometer screw with 1" range. Desirable where large range of long inside measurements is required.

Wooden Case	No. 599-262	\$32.50
	No. 599-262-9999	8.00

263 Inside Micrometer 1" to 2" by .001"

Has 2 measuring rods and spacing collar. Measures 1" to 1 1/4" with short rod only and 1 1/4" to 1 1/2" with short rod and collar. Measures 1 1/2" to 1 3/4" with long rod only and 1 3/4" to 2" with long rod and collar. Has clamp screw. See also Handle 287 on page 11.

Case	No. 599-263	\$13.25
	No. 599-263-9999	2.30

264 Inside Micrometer 2" to 8" by .001"

Has 6 measuring rods and spacing collar. Ends of rods hardened and adjustable for wear. Desirable feature is adjustable point on thimble as it receives more wear than individual rods. This permits exact overall length of micrometer head, 1.573", to be maintained. Has clamp screw. See Handle 287 on page 11.

Case	No. 599-264	\$19.00
	No. 599-264-9999	2.75

265 Inside Micrometer 2" to 12" by .001"

Similar to 264 but has 10 measuring rods and spacing collar, providing greater range. See Handle 287, page 11.

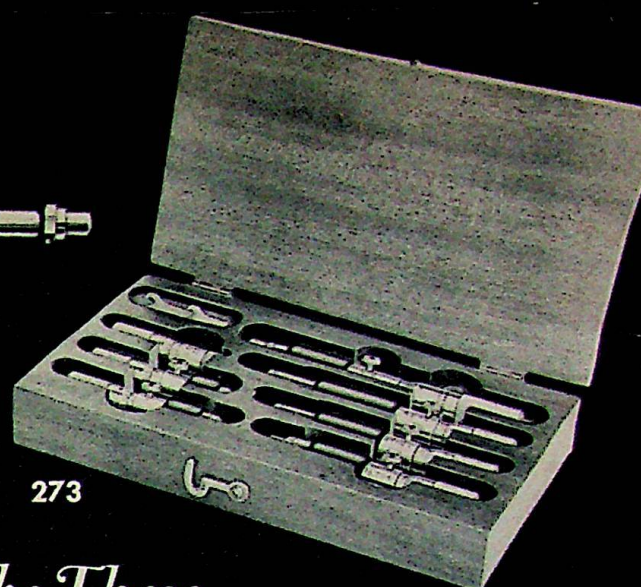
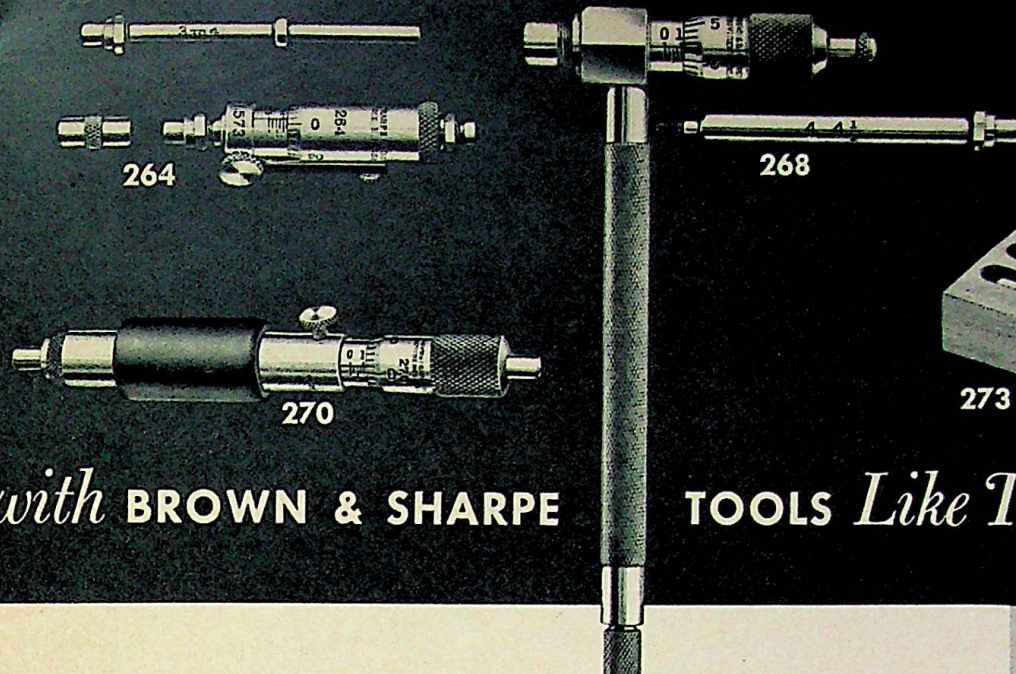
Case	No. 599-265	\$23.00
	No. 599-265-9999	4.00

266 Inside Micrometer 2" to 8" by .001"

Similar to 264 but does not have clamp screw. See Handle 287, page 11.

Case	No. 599-266	\$17.00
	No. 599-264-9999	2.75

At Left—Ten-thousandths are measured with ease on 245 by dial gage or micrometer. And its measuring pressure is adjustable to match the conditions.



with **BROWN & SHARPE**

TOOLS *Like These*

267 Inside Micrometer 2" to 12" by .001"

Similar to 265 but does not have clamp screw. See Handle 287 below.

	No. 599-267	\$21.00
Case	No. 599-265-9999	4.00

268 Telescoping Inside Micrometer 2" to 6" by .001"

Has 8 measuring rods. Combines advantages of telescoping gage with an inside micrometer. Measuring point adjusts itself to the work and is locked in position by turning knurled knob on handle end. When tool is withdrawn from hole, micrometer thimble is turned until it contacts shoulder on rod and reading is taken. Handle is 3 3/4" long and placed near fixed end of tool, the most sensitive position for accurate measurement. Measuring rods are adjustable for wear.

	No. 599-268-8	\$35.00
Case	No. 599-268-9999	4.00

270 Tubular Inside Micrometers 2" to 12" by .001"

Light and convenient to handle. Heads of small micrometers have 1/2" movements; large, 1". Measuring points are hardened and ground on a radius for measuring both parallel and curved surfaces. Fibre grips protect against heat of hand. Small sizes have one grip; large sizes, two. All, except smallest size, have clamp screw. See Handle 287 below.

Range, Inches	No.	Price	Range, Inches	No.	Price
2 to 2 1/2	No. 599-270-25	\$11.50	5 to 6	No. 599-270-60	\$12.50
2 1/2 to 3	No. 599-270-30	11.50	6 to 7	No. 599-270-70	12.50
3 to 3 1/2	No. 599-270-35	11.50	7 to 8	No. 599-270-80	12.50
3 1/2 to 4	No. 599-270-40	11.50	8 to 9	No. 599-270-90	12.50
4 to 4 1/2	No. 599-270-45	11.50	9 to 10	No. 599-270-100	12.50
4 1/2 to 5	No. 599-270-50	11.50	10 to 11	No. 599-270-110	13.00
			11 to 12	No. 599-270-120	13.00

Tubular Inside Micrometer Sets

Furnished in finished wooden case.

273	7 Micrometers	2" to 6" by .001"	No. 599-273	\$ 88.00
274	13 Micrometers	2" to 12" by .001"	No. 599-274	170.00

276 Tubular Inside Micrometers 12" to 42" by .001"

3 sizes. For long inside measurements. Light and easy to handle. Hardened measuring points ground on radius, for measuring both parallel and curved surfaces. Have clamp screws. Each size has 10 measuring rods. Rods have means of adjustment and are held in position by clamp screw that fits in a V groove. Each tool furnished in finished wooden case.

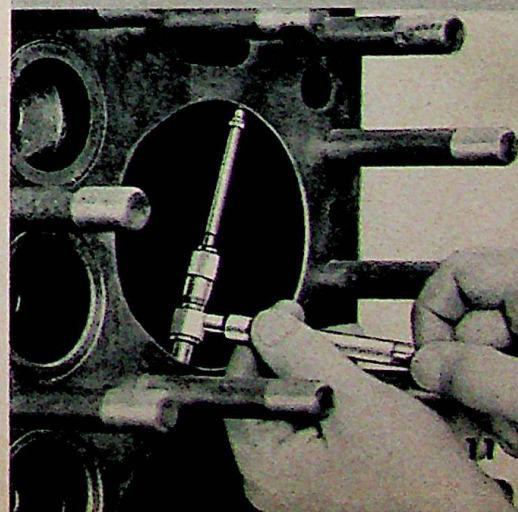
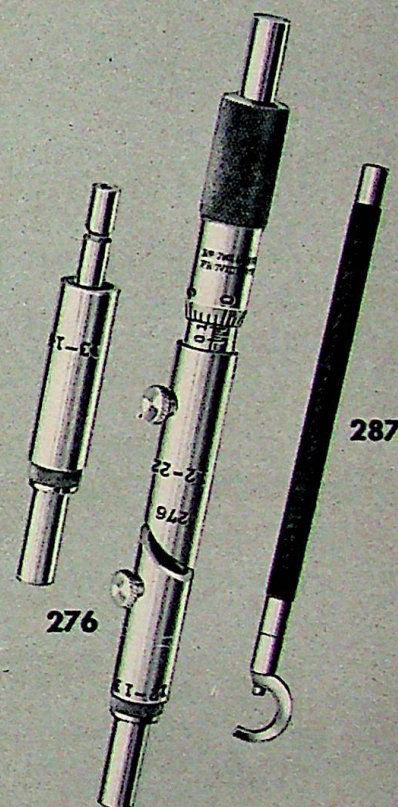
Range, Inches	No.	Price
12 to 22	No. 599-276-22	\$69.50
22 to 32	No. 599-276-32	75.50
32 to 42	No. 599-276-42	82.00

287 Inside Micrometer Handle

For 263, 264, 265, 266, 267 and 270 (2" to 5") Micrometers. Handle, 5 3/8" long, permits inside micrometers to be inserted in small holes for a greater distance than by hand alone. Brass clamping plug prevents marring micrometer.

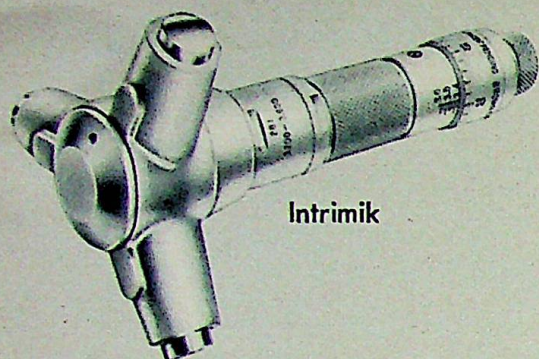
No. 599-287	\$2.00
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At Right—A Telescoping Inside Micrometer makes play of measuring holes and recesses. When inserted, the tool expands to the work. Clamp, remove—presto, you have your measurement.

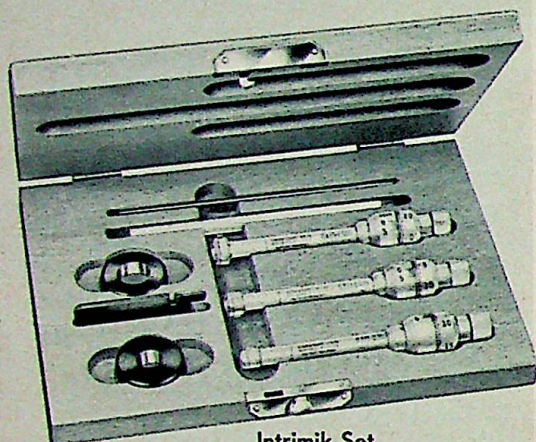


BROWN & SHARPE INTRIMIK ...

The Internal Tri-Point Micrometer



Intrimik



Intrimik Set



290RS



295RS



296RS

INTRIMIKS. Internal Tri-Point Micrometers

.275" to .500" by .0001", .500" to 4.000" by .0002" and 4.000" to 8.000" by .0005"

Intrimik offers unusual advantages for measuring bores or holes. It measures directly and eliminates the need for many setting rings or plugs. The three active measuring points centralize tool; instrument aligns itself axially and radially. Ratchet stop provides correct and unvarying measuring pressure. Extensions furnished as extras make possible measurements at greater depths.

Range, Inches	Measure to Depth, Inches With Extensions			Number	Price
	None	One	Two		
.275 to .350 by .0001	2	6	10	599-281-3	\$59.00
.350 to .425 by .0001				599-281-4	59.00
.425 to .500 by .0001				599-281-5	59.00
.500 to .600 by .0002				599-281-6	64.00
.600 to .700 by .0002				599-281-7	64.00
.700 to .800 by .0002	3	9	15	599-281-8	64.00
.800 to 1.000 by .0002				599-281-10	67.00
1.000 to 1.200 by .0002				599-281-12	67.00
1.200 to 1.400 by .0002				599-281-14	67.00
1.400 to 1.600 by .0002				599-281-16	67.00
1.600 to 2.000 by .0002				599-281-20	74.00
2.000 to 2.400 by .0002				599-281-24	74.00
2.400 to 2.800 by .0002				599-281-28	74.00
2.800 to 3.200 by .0002				599-281-32	74.00
3.200 to 3.600 by .0002				599-281-36	74.00
3.600 to 4.000 by .0002	4	10	*	599-281-40	74.00
4.000 to 5.000 by .0005				599-281-50	126.00
5.000 to 6.000 by .0005				599-281-60	140.00
6.000 to 7.000 by .0005				599-281-70	154.00
7.000 to 8.000 by .0005				599-281-80	167.00

*Use only one Extension. Intrimiks, 4.000" to 8.000" are made by Tesa, S.A. and sold by Brown & Sharpe.

Extensions, Setting Rings, Cases for Intrimiks, and Sets can be furnished.

Intrimiks are for sale only in the United States of America and its territories, Mexico and Central America.

MICROMETER HEADS

Useful in making accurate settings and close adjustments of machine slides, cutting tools and closely positioning machine parts. Diameter of shank of 296RS is $\frac{1}{2}$ "; all others, $\frac{3}{8}$ ".

290 and 290RS $\frac{1}{2}$ -inch Micrometer Heads Measure by .001"

290	No. 599-290	\$9.00
290RS (Has ratchet stop)	No. 599-290-20	9.75

291 and 291RS $\frac{1}{2}$ -inch Micrometer Heads Similar to 290 and 290RS. Measure by .0001"

291	No. 599-291-6	\$11.50
291RS (Has ratchet stop)	No. 599-291-26	12.25

294 and 294RS 1-inch Micrometer Heads Similar to 295 and 295RS. Measure by .001"

294	No. 599-294	\$9.00
294RS (Has ratchet stop)	No. 599-294-20	9.75

295 and 295RS 1-inch Micrometer Heads Measure by .0001"

295	No. 599-295-6	\$11.50
295RS (Has ratchet stop)	No. 599-295-26	12.25

296RS 1-inch Heavy Micrometer Head Measures by .001"

296RS (Has ratchet stop)	No. 599-296-20	\$15.50
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Intrimik measures the exact hole size. Discloses how much it may be over or under size, a condition impossible to determine with gages of fixed dimensions.

The three measuring points align tool axially and radially and the ratchet stop provides exact and unvarying degree of measuring pressure.

Micrometer heads serve as integral parts of machines and attachments, accurately determining adjustments or table movements as well as tool settings.

BROWN & SHARPE RULES

are Quality Tools ... Machine Divided for Accuracy

Standards of Length

The Standards of Length which are in common use today are an Anglo-Saxon heritage adopted many years ago to eliminate the confusion caused by the employment of many different units of measurement and the absence of a uniform system.

About 4000 B.C. the cubit, the distance from the tip of the middle finger to the elbow of a bent arm was a standard unit of measurement and with this unit the pyramids were built.

Divisions of the cubit followed: the Span, the length between the tips of the thumb and little finger, $\frac{1}{2}$ cubit; the Palm, the breadth of 4 fingers, $\frac{1}{6}$ cubit; the Foot, $\frac{2}{3}$ of a cubit or about 12.16 inches.

Later, King Edward the 2nd, decreed the length of 3 barley corn kernels equalled 1".

As time unfolded, increasing variance was noted in the lengths of these and other existing units of measurement so that the need for clearly defined and universal standards became evident.

In modern times a standard yard was legalized in 1824 by the British Parliament but was destroyed by fire in 1834. The British Imperial Yard "Bronze No. 1" was legalized in 1855, and one of forty copies, "Bronze No. 11" was presented to the United States. At the same time another copy "Low Moor Iron No. 57" was sent to this country. Since 1893 the United States yard has been defined in terms of the meter.

The use of metric system was legalized in this country in 1866 and the U.S. yard is defined as 3600/3937 part of a meter.

An important standard of length is the wave length of red cadmium light which is .000000644 meter long. Wave lengths of many other useful radiations including that of Mercury Isotope 198 have been compared with that of red cadmium.

Standards were prepared for use in our own shops, the mean errors of which were twenty millionths inch for the yard and .000005M for the meter, both being long. These standards have been subdivided carefully. Our Rules and Vernier Tools are as nearly exact copies as expert toolmakers and highly specialized equipment can make them.

Our Master Line Standards and Gage Blocks are checked periodically at the Bureau of Standards and our measuring equipment and graduating machines are calibrated frequently and adjusted to these Masters.

Features of Brown & Sharpe Rules

The extreme care used in safeguarding the accuracy of our standards is reflected in the precision of Brown & Sharpe Tools, including Steel Rules.

Brown & Sharpe Rules are made of the highest quality steel and are machine graduated to provide graduations of unvarying accuracy. The rules are easy to read accurately because of the uniform width and depth of the graduation lines.

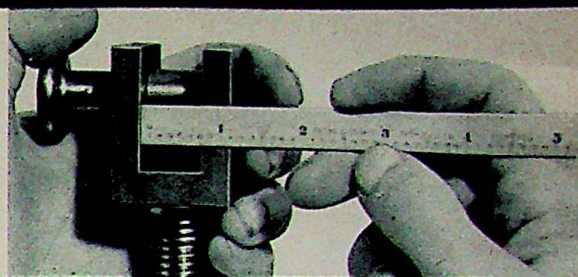
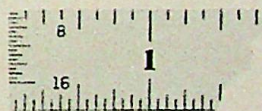
The two latest members of the Brown & Sharpe rule family, 312 and 316, have a non-glare, dull chrome finish with black graduations—America's most easily read rules.

Graduations

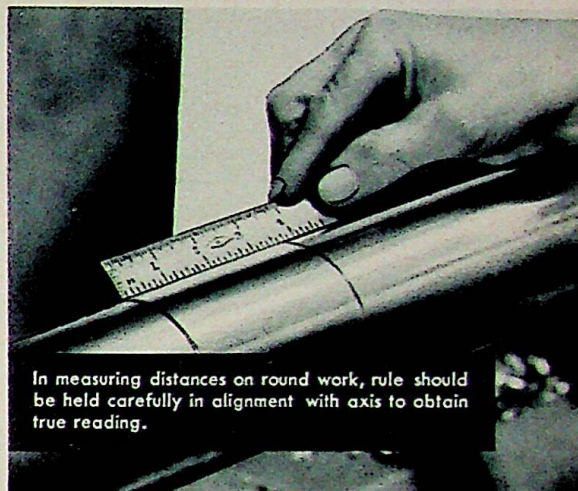
Brown & Sharpe Rules 300, 315, 316 and 320 up to and including 12" in length are graduated in 32nds on each end of one side, an advantage in measuring the depth and width of grooves, countersinks and recesses.

Graduations and Graduation Numbers

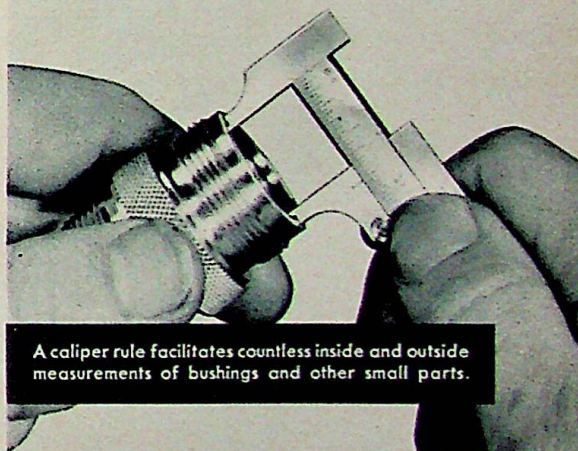
Graduation	No. 4	No. 8	No. 9	No. 10	No. 11	No. 12
1st edge	8ths	32nds	16ths	32nds	64ths	50ths
2nd edge	16ths	64ths	32nds	64ths	100ths	100ths
3rd edge	32nds	10ths	64ths			
4th edge	64ths	100ths				



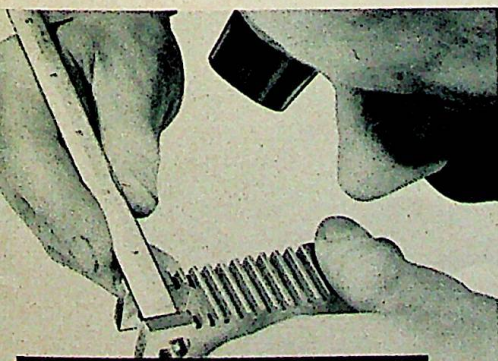
In measuring a slot the rule should be held as nearly as possible perpendicular to the faces of the slot to obtain true measurement and true sighting.



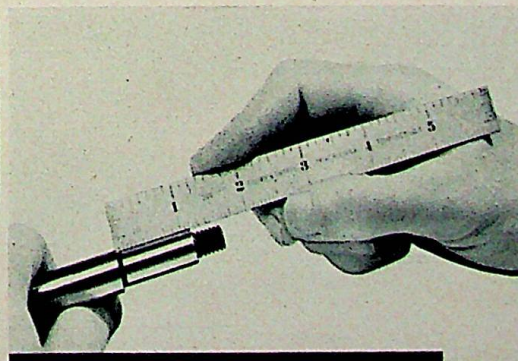
In measuring distances on round work, rule should be held carefully in alignment with axis to obtain true reading.



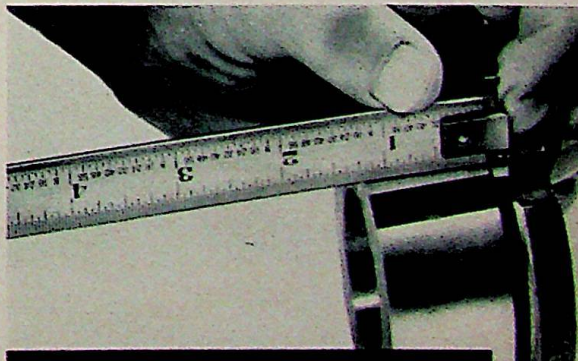
A caliper rule facilitates countless inside and outside measurements of bushings and other small parts.



With a precisely graduated rule and a loupe, skilled craftsmen claim the ability to split $\frac{1}{4}$ " into three parts—and with consistent accuracy.



The new Brown & Sharpe non-glare, dull chrome finish rules are the easiest rules in America to read. Note how clearly the graduations stand out in measuring this stud.



The sliding hook of a Brown & Sharpe Hook Rule is a great advantage. It permits accurate measurement from shallowest recesses.

Tempered Steel . . . Flexible . . . There's a Narrow . . . Shrink . . . Hook . . . Stainless . . . Chrome Finish and Caliper Rules

300

300 Tempered Steel Rules

(No. 4 Grad. 8ths, 16ths, 32nds and 64ths), $\frac{1}{20}$ " thick except 48" which is $\frac{1}{10}$ ".

6"	($\frac{11}{16}$ " wide)	No. 599-300-604	\$ 1.35
12"	(1" wide)	No. 599-300-1204	2.50
24"	($\frac{31}{32}$ " wide)	No. 599-300-2404	5.25
36"	(1" wide)	No. 599-300-3604	11.75
48"	(1 $\frac{1}{2}$ " wide) Not tempered.	No. 599-300-4804	16.50

Leather case for 6" rules can be furnished. See opposite page.

303 Narrow Tempered Steel Rules

$\frac{1}{2}$ " wide, $\frac{1}{16}$ " thick. Graduated on one edge of each side only.

4"	(No. 10 Grad. 32nds and 64ths)	No. 599-303-410	\$1.15
6"	(No. 10 Grad. 32nds and 64ths)	No. 599-303-610	1.35
6"	(No. 11 Grad. 64ths and 100ths)	No. 599-303-611	1.35
12"	(No. 10 Grad. 32nds and 64ths)	No. 599-303-1210	2.50

306 Flexible Steel Rules (Tempered)

$\frac{1}{2}$ " wide, $\frac{1}{16}$ " thick. Graduated on both edges of one side only.

6"	(No. 10 Grad. 32nds and 64ths)	No. 599-306-610	\$1.35
6"	(No. 11 Grad. 64ths and 100ths)	No. 599-306-611	1.35
6"	(No. 12 Grad. 50ths and 100ths)	No. 599-306-612	1.35
12"	(No. 10 Grad. 32nds and 64ths)	No. 599-306-1210	2.50

Leather case for 6" rules can be furnished. See opposite page.

306A Flexible Steel Rule (Tempered)

$\frac{1}{2}$ " wide, $\frac{1}{16}$ " thick. Has figured graduations. Leather case can be furnished. See opposite page.

6"	(No. 10 Grad. 32nds and 64ths)	No. 599-306-691	\$1.35
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306C Flexible Steel Rule (Tempered)

$\frac{1}{2}$ " wide, $\frac{1}{16}$ " thick. No. 9 Grad. 16ths and 32nds on one side, and 64ths on one edge of the other side. 32nds and 64ths are figured. Can be turned over quickly from one figured graduation to the other. Leather case can be furnished. See opposite page.

6"	No. 599-306-692	\$1.40
----	-----------------	--------

311 Flexible Steel Rule (Tempered)

$\frac{1}{2}$ " wide, $\frac{1}{16}$ " thick. No. 8 Grad. 32nds and 64ths on one side and 10ths and 100ths on the other. Permits measurements in fractions on one side and decimals on the other. Has figured graduations. Leather case can be furnished. See opposite page.

6"	No. 599-311-608	\$1.50
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312 Chrome Finish Flexible Steel Rule (Tempered)

$\frac{1}{2}$ " wide, $\frac{1}{16}$ " thick. No. 9 Grad. 16ths and 32nds on one side and 64ths on one edge of other side. Easy to read. Dull chrome. Rust and stain resistant. Non-glaring. Long wearing. Has figured graduations. Leather case can be furnished. See opposite page.

6"	No. 599-312-692	\$2.25
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315 Tempered Steel Rules

$\frac{1}{20}$ " thick. (No. 4 Grad. 8ths, 16ths, 32nds and 64ths) Have figured graduations.

2"	($\frac{35}{64}$ " wide)	No. 599-315-204	\$.80
3"	($\frac{35}{64}$ " wide)	No. 599-315-304	1.05
4"	($\frac{19}{32}$ " wide)	No. 599-315-404	1.25
6"	($\frac{11}{16}$ " wide)	No. 599-315-604	1.50
12"	(1" wide)	No. 599-315-1204	2.75
24"	(1" wide)	No. 599-315-2404	5.50

Leather case for 6" rules can be furnished. See opposite page.

316 Chrome Finish Tempered Steel Rules

$\frac{1}{20}$ " thick. (No. 4 Grad. 8ths, 16ths, 32nds and 64ths) Dull chrome. Non-glaring. Easy to read. Rust and stain resistant. Long wearing. Have figured graduations.

6"	($\frac{11}{16}$ " wide)	No. 599-316-604	\$2.40
12"	(1" wide)	No. 599-316-1204	4.75

Leather case for 6" rules can be furnished. See opposite page.

320 Tempered Hook Rules

$\frac{1}{20}$ " thick. (No. 4 Grad. 8ths, 16ths, 32nds and 64ths) Have figured graduations and end graduations. Sliding hook facilitates accurate measurements from shallow shoulders.

6"	($\frac{11}{16}$ " wide)	No. 599-320-604	\$2.50
12"	(1" wide)	No. 599-320-1204	3.75

325 Narrow Tempered Hook Rules

$\frac{1}{2}$ " wide, $\frac{1}{20}$ " thick. (No. 10 Grad. 32nds and 64ths) Permit measurements through holes as small as $\frac{3}{8}$ " diameter.

6"	No. 599-325-610	\$2.25
12"	No. 599-325-1210	3.50

303

306A

306

306C

312

311

316

315

320

325

BROWN & SHARPE RULE

for Every Need

335 Steel Rules with Holder* (Tempered rules)

5 rules interchangeable in holder, furnished in leatherette case: Rule lengths: $\frac{1}{4}$ " $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1". No. 10 Grad. 32nds and 64ths. Rules can be set at various angles.

*Rules and holder can be furnished individually; $\frac{1}{2}$ " and 1" rules with No. 12 Grad. also.

340, 341, 342, 343, 344 and 345 Tempered Steel Shrink Rules
1" wide. (No. 4 Grad. 8ths, 16ths, 32nds and 64ths) Give allowances for shrinkages of different metals directly.

340	$\frac{1}{16}$ " shrink per foot		
	12"	No. 599-340-1204	\$3.20
	24"	No. 599-340-2404	7.25
341	$\frac{1}{8}$ " shrink per foot		
	12"	No. 599-341-1204	\$3.20
	24"	No. 599-341-2404	7.25
342	$\frac{3}{16}$ " shrink per foot		
	12"	No. 599-342-1204	\$3.20
	24"	No. 599-342-2404	7.25
343	$\frac{1}{4}$ " shrink per foot		
	12"	No. 599-343-1204	\$3.20
	24"	No. 599-343-2404	7.25
344	$\frac{5}{16}$ " shrink per foot		
	12"	No. 599-344-1204	\$3.20
	24"	No. 599-344-2404	7.25
345	$\frac{3}{32}$ " shrink per foot		
	12"	No. 599-345-1204	\$3.20
	24"	No. 599-345-2404	7.25

350 Stainless Steel Rules (Tempered)

(No. 4 Grad. 8ths, 16ths, 32nds and 64ths)

6"	($\frac{1}{16}$ " wide)	No. 599-350-604	\$2.00
12"	(1" wide)	No. 599-350-1204	4.00

Leather case for 6" rules can be furnished. See below.

356 Flexible Stainless Steel Rule (Tempered)

$\frac{1}{4}$ " wide. Graduated on both edges of one side only.

6"	(No. 10 Grad. 32nds and 64ths)	No. 599-356-30	\$2.00
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Leather case can be furnished. See below.

377 Key Seat Clamps

For laying out keyways. Easily attached to steel rules, combination square blades and straight edges.

Pair	No. 599-377	\$1.35
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385 Slide Caliper Rule

$\frac{1}{16}$ " wide, about $\frac{1}{16}$ " thick. For measuring small rods, sheet stock etc. Graduated in 32nds on both edges of one side only. $4\frac{3}{16}$ " long. Jaws are $\frac{3}{8}$ " deep.

No. 599-385-430	\$5.75
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388 Pocket Slide Caliper Rule

Accurately measures inside and outside diameters. Clamp nut locks slide. Graduated in 32nds on one edge for 3", and in 64ths on slide for $2\frac{1}{2}$ ". $\frac{1}{8}$ " thick. Jaws are $\frac{5}{8}$ " long and measure to 2". Nibs can be inserted in holes as small as $\frac{1}{8}$ " diameter.

No. 599-388-330	\$7.00
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391 Steel Caliper Rules**

Graduated on one side in 8ths and 16ths and on the other in 32nds and 64ths. Slide graduated in 32nds and 64ths.

3"	(Slide measures $2\frac{1}{4}$ ")	No. 599-391-330	\$10.00
4"	(Slide measures $3\frac{1}{4}$ ")	No. 599-391-430	14.00

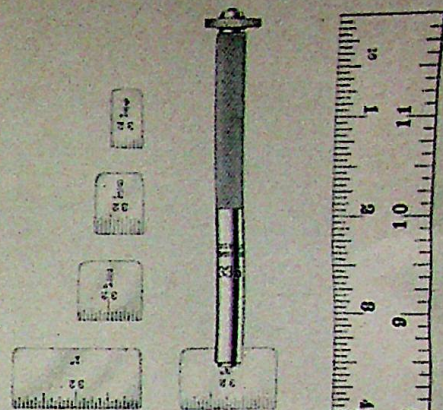
**Furnished to order chromium plated.

Cases

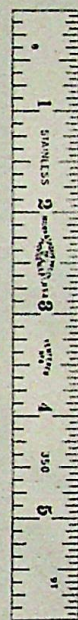
Has clip. For 300, 315, 316, and 350—6" Rules. No. 599-300-9998 \$.25

Has clip. For 306, 306A, 306C, 311, 312 and 356—6" Rules. No. 599-306-9999-1 .25

For 306, 306A, 306C, 311, 312 and 356—6" Rules. No. 599-306-9999 .25



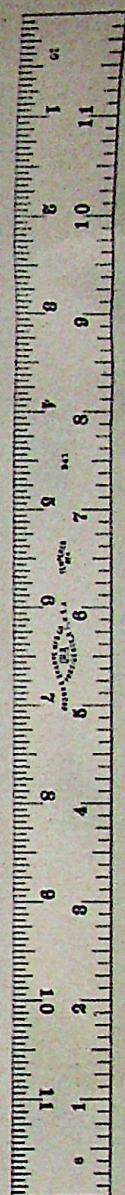
335



350



356



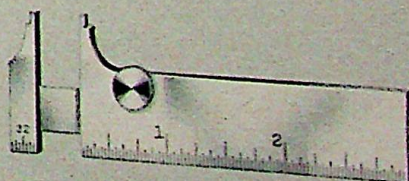
341



377



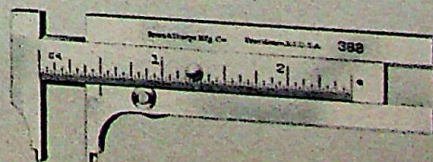
385



388



391



Features of BROWN & SHARPE Combination Squares and Sets, and Protractors

Combination Squares, Combination Sets and Protractors have been designed and constructed with the idea that they will be the best tools of their kind. They are well made and adaptable to a great many uses. The unhardened heads are of cast iron and the hardened heads are dropped forged—light, durable and convenient. The revolving turrets in the protractors are fitted nicely and graduated to 90 degrees either side of zero. They can be set at any angle and clamped rigidly by a thumb nut.

The reversible bolt is an exclusive and very convenient Brown & Sharpe feature. It permits either side of the blade, with the graduations required for a particular job, to be used as desired. The knurled tip on the bolt permits it to be reversed without its being removed from the head itself.

The round clamping groove allows the blades to be inserted quickly in the heads, and the bolt forces the blade against the bottom of the slot, in accurate alignment with the head, and the round blade groove presents no sharp corners to collect dirt and interfere with the accuracy of the tool.

Levels are furnished on square heads and protractors. Hardened steel scribes which can be inserted in a hole in the head for safekeeping when not in use are furnished with the square heads.

The square heads have wide surfaces and, together with the blade, make excellent try squares. Also, the blade, either with a square head or a protractor, can be used as a depth or height gage and the 45 degree angle finds frequent use. The ends of the center heads are ground accurately and this tool can be used as a T square as well as on round work of a large diameter.

The blades are tempered and graduated with the same care and accuracy as our steel rules.

All parts of the same size are interchangeable. The uses of Combination Squares, Sets and Protractors are almost limitless. They are particularly flexible tools and facilitate the ease with which many jobs can be done in the shop.

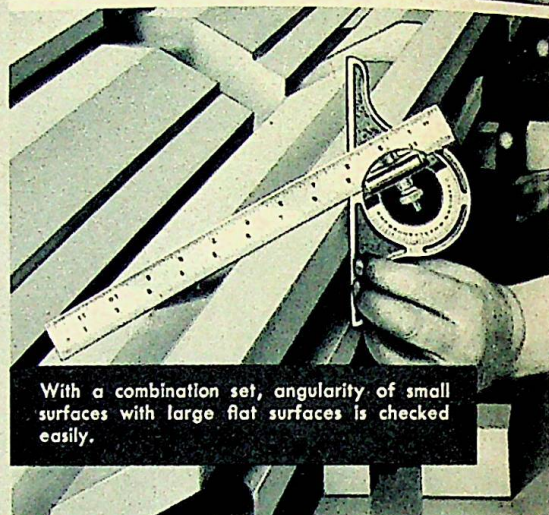
Combination Squares

With Heads Hardened				With Heads Not Hardened			
400	6"	No. 599-400-604	\$ 8.60	402	6"	No. 599-402-604	\$ 5.95
400	12"	No. 599-400-1204	11.70	402	9"	No. 599-402-904	8.85
400	24"	No. 599-400-2404	15.30	402	12"	No. 599-402-1204	9.60
401	6"	No. 599-401-604	5.80	402	24"	No. 599-402-2404	13.20
401	12"	No. 599-401-1204	8.10	403	6"	No. 599-403-604	4.20
401	24"	No. 599-401-2404	11.70	403	12"	No. 599-403-1204	7.10
				403	24"	No. 599-403-2404	10.70

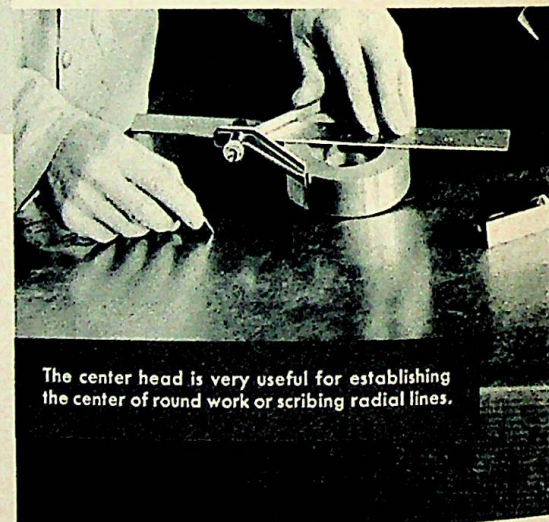
Graduations 400, 401, 402 and 403

Edge	1st	2nd	3rd	4th
No. 4	8ths	16ths	32nds	64ths

With a protractor, angular surfaces in machine operations can be checked easily.



With a combination set, angularity of small surfaces with large flat surfaces is checked easily.

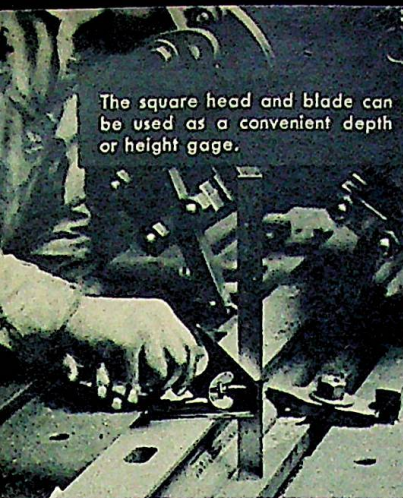


The center head is very useful for establishing the center of round work or scribing radial lines.

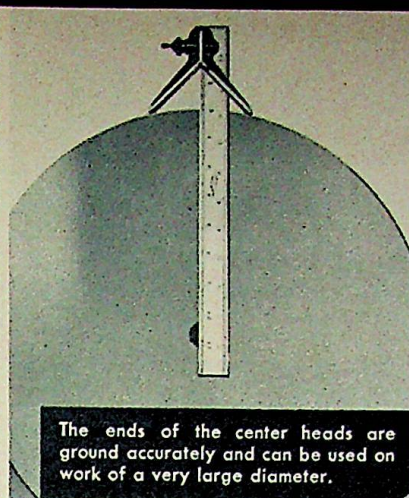
400 and 402

Blades are tempered

401 and 403



The square head and blade can be used as a convenient depth or height gage.



The ends of the center heads are ground accurately and can be used on work of a very large diameter.

Combination Sets

With Square and Center Heads Hardened

425	12"	No. 599-425-1204	\$17.25
425	24"	No. 599-425-2404	20.85
438	12" with Reversible Protractor Head	No. 599-438-1204	19.50
438	24" with Reversible Protractor Head	No. 599-438-2404	23.10

With Square and Center Heads Not Hardened

426	12"	No. 599-426-1204	\$15.15
426	24"	No. 599-426-2404	18.75
439	12" with Reversible Protractor Head	No. 599-439-1204	17.40
439	24" with Reversible Protractor Head	No. 599-439-2404	21.00

Protractors

450	12"	No. 599-450-1204	\$ 9.15
450	24"	No. 599-450-2404	12.75
*456	12"	No. 599-456-1204	11.40
*456	24"	No. 599-456-2404	15.00

*Not shown. Has Reversible Protractor Head

Graduations 425, 426, 438, 439, 450 and 456

Edge	1st	2nd	3rd	4th
No. 4	8ths	16ths	32nds	64ths

ATTACHMENTS

For use on 12" and 24" Brown & Sharpe Combination Squares and Sets.

465 Height Gage Attachment

Can be used from extreme top to bottom of blade. Inside end of pointer aligns with blade edge for accurate reading. Frame is drop forged. Pointer is hardened, tempered and ground. No. 599-465 \$5.60

468 Depth Gage Attachment 0 to 4 1/2"

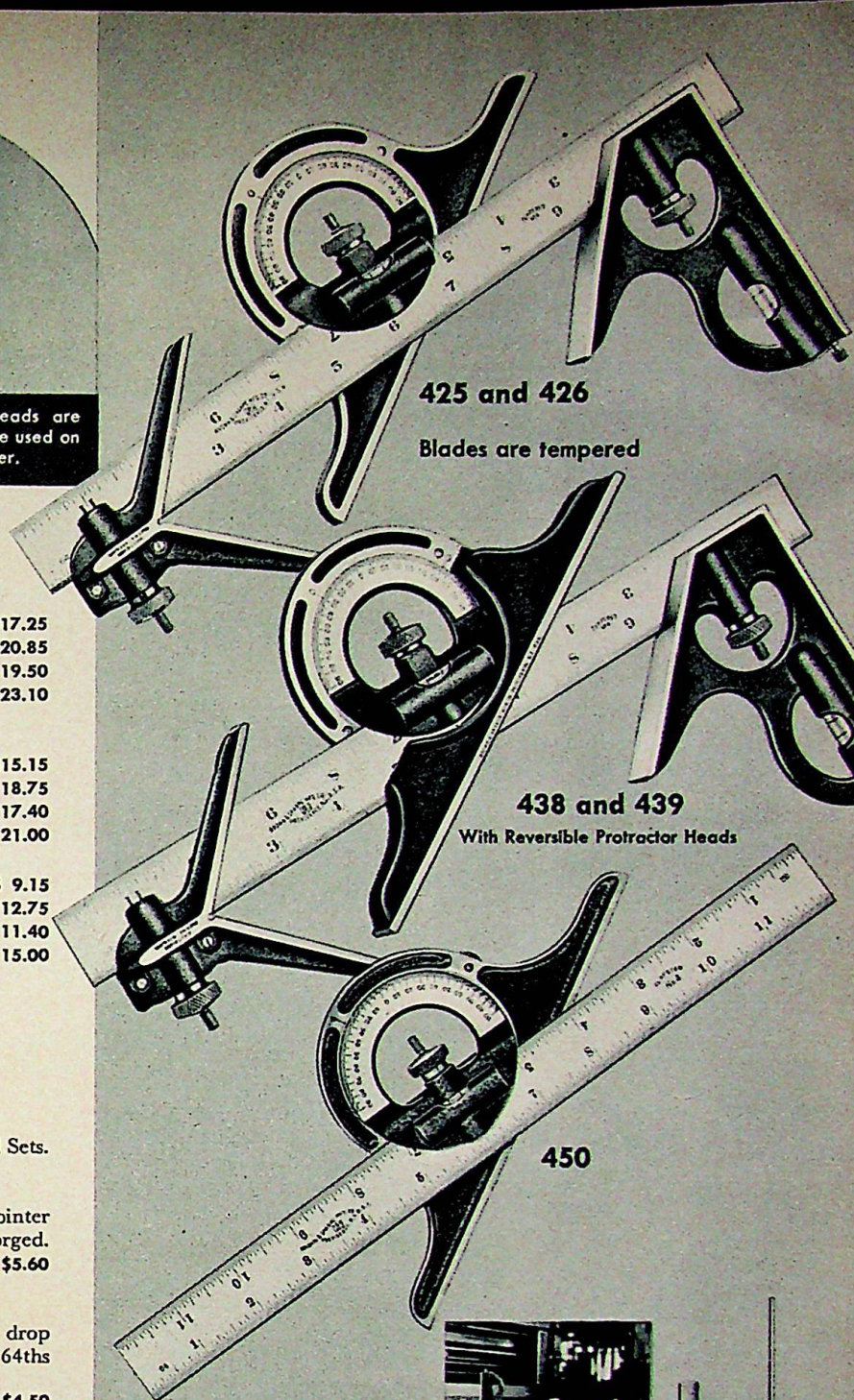
Particularly useful in measuring depths of wide recesses. Frame is drop forged. 6" blade has No. 10 Grad. 32nds and 64ths, or No. 11, 64ths and 100ths. 5/16" rod is useful in small holes.

468	No. 10 Grad.	No. 599-468-62	\$4.50
468	No. 11 Grad.	No. 599-468-65	4.50

Separate Parts For Combination Squares and Sets, and Protractors.

Blades, except as noted, have No. 4 Grad., 8ths, 16ths, 32nds and 64ths.

Blade, 6"	No. 599-9400-604	\$2.20
Blade, 9"	No. 599-9400-904	2.85
Blade, 12"	No. 599-9402-1204	3.60
Blade, 12", No. 8 Grad., 32nds, 64ths, 10ths and 100ths	No. 599-9400-1208	4.20
Blade, 12" with Figured Graduations	No. 599-9400-1204	4.20
Stainless Steel Blade, 12" with Figured Graduations	No. 599-9403-1204	5.50
Blade, 18"	No. 599-9400-1804	5.50
Blade, 24"	No. 599-9400-2404	7.20
Square Head, Not Hard., 6"	No. 599-9402-1106	2.00
Square Head, Not Hard., 9", 12", or 24"	No. 599-9402-1109	3.50
Square Head, Hard., 6"	No. 599-9400-1006	3.60
Square Head, Hard., 9", 12", or 24"	No. 599-9400-1009	4.50
Center Head, Not Hard., 6"	No. 599-9402-2106	1.75
Center Head, Not Hard., 9", 12", or 24"	No. 599-9402-2109	2.50
Center Head, Hard., 6"	No. 599-9400-2006	2.80
Center Head, Hard., 9", 12", or 24"	No. 599-9400-2009	3.60
Protractor, Plain, 9", 12", or 24"	No. 599-9425-3009	5.55
Protractor, Reversible, 9", 12", or 24"	No. 599-9438-3109	7.80
Scriber	No. 99-400-1056	.40
Level Glass	No. 99-400-1054	.40



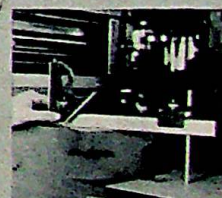
425 and 426

Blades are tempered

438 and 439

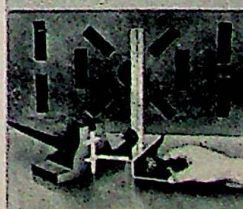
With Reversible Protractor Heads

450

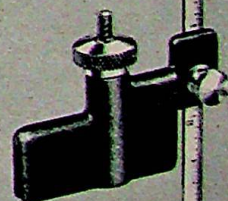


Note easy measurement of distance between stepped surfaces with 468.

465

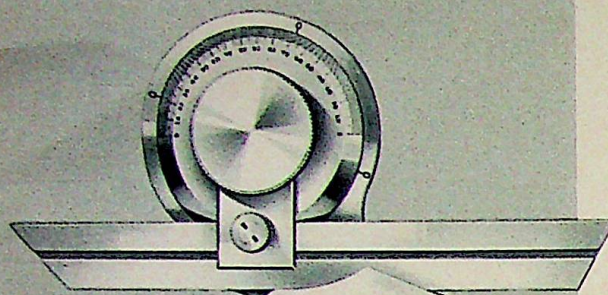


Attachment 465 quickly converts a combination square into a useful height gage.

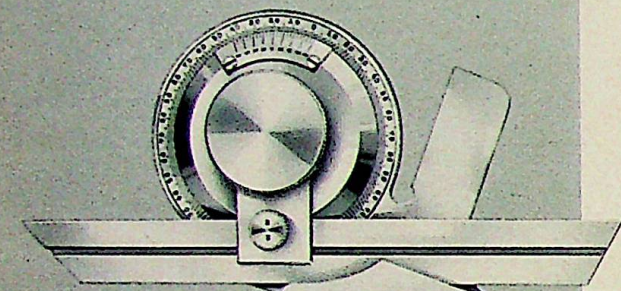


468

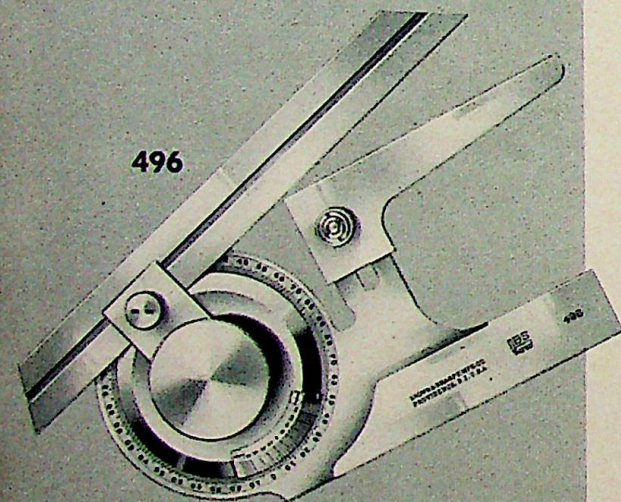
BROWN & SHARPE *Bevel Protractors and Bevels*



493



495



496

Features of Bevel Protractors

Bevel Protractors are among the finest of precision tools, requiring expert skill in manufacture, fitting and graduating. In the tools having a vernier, the graduations are below the dial surface, protecting them from wear and all parts are finished with nicety and precisely fitted. They are the finest instruments in their class.

493 Bevel Protractor With 6" or 12" blade

For work where angles are to be measured to a degree of accuracy not requiring a vernier. Dial, graduated 0 to 90° from each extremity of arc of 180°, is rigidly clamped by thumb nut. Blade, $\frac{1}{16}$ " thick, can be moved longitudinally and clamped independently of dial. Extra blades can be furnished.

With 6" Blade	No. 599-493-6	\$22.00
Case	No. 599-493-9998	3.75
With 12" Blade	No. 599-493-12	24.25
Case	No. 599-493-9999	5.00

495 Universal Bevel Protractor With 6" or 12" blade

For all classes of work where angles are to be measured. Dial is graduated in degrees through a complete circle and the vernier reads to 5 minutes or 1/12 degree. Dial clamped by thumb nut. Blade, $\frac{1}{16}$ " thick, can be moved longitudinally and clamped independently of dial. Extra blades can be furnished.

With 6" Blade	No. 599-495-6	\$31.00
Case	No. 599-493-9998	3.75
With 12" Blade	No. 599-495-12	32.50
Case	No. 599-493-9999	5.00

Reading the Vernier

The Vernier indicates every 5 minutes (5') or one twelfth of a degree. Each space upon the Vernier is 5 minutes shorter than two spaces on the scale.

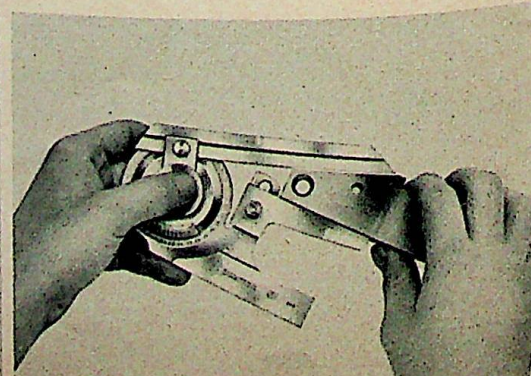
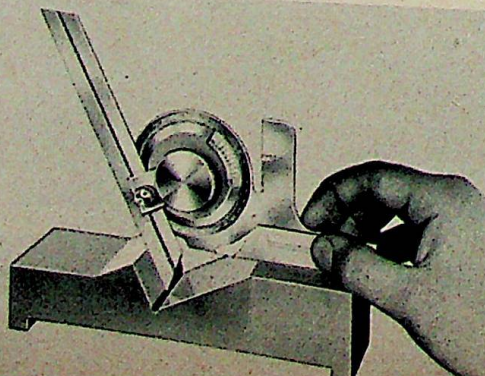
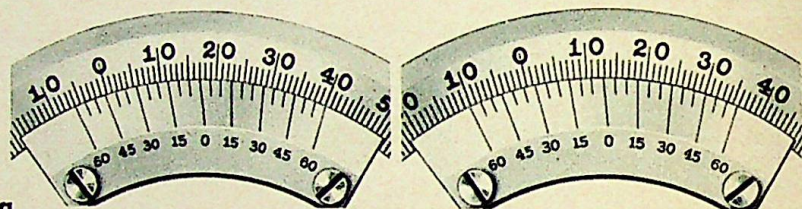
When the zero on the Vernier exactly coincides with a graduation on the scale, the reading is in exact degrees, as in cut at left in which the reading is 17° 0'. When the zero graduation on the Vernier does not exactly coincide with a graduation on the scale, the graduation on the Vernier that does coincide with a graduation on the scale indicates the number of 12ths of a degree or units of 5 minutes to be added to the whole degree reading.

Read off directly from the scale the number of whole degrees between zero on the scale and zero on the Vernier. Then count, in the same direction, the number of divisions from the zero of the Vernier to the first line on the scale which coincides with a line on the scale. The number of these divisions multiplied by 5 will be the number of minutes to be added to the whole number of degrees.

Example: Cut at right shows the zero on the Vernier between 12 and 13 on the scale. Counting to the right from zero on the scale, the zero on the Vernier has therefore moved twelve whole degrees. In the same direction the 10th line of the Vernier, representing 50 minutes (50'), is the line which exactly coincides with a line on the scale. We, therefore, have 50 minutes to be added to the reading of twelve degrees on the scale. The reading, then, is 12° 50'.

Since the divisions, both on the scale and on the Vernier, are numbered both to the right and left from a basis of zero, any size angle can be measured, and the readings on the scale and on the Vernier are taken either to the right or left, according to the direction in which the zero on the Vernier is moved.

Below Left—Bevel Protractor is being used to measure the angular clearance on a ring gear.
Below Center—Illustration shows a bevel protractor being used to establish an angle and determine its relationship to other surfaces of a machine part.
Below Right—Illustration demonstrates how simply acute angles are measured accurately with bevel protractor equipped with an acute angle attachment.



Lay out and Transfer Angles with Precision

496 Universal Bevel Protractor With Acute Angle Attachment (see opposite page)

With 6 or 12-inch blade. Designed for all classes of work where angles are to be laid out with precision. With the Acute Angle Attachment, extremely small angles can be established easily and quickly.

As one side of the tool is flat, it can be laid flat upon paper or work. Dial is graduated in degrees through a complete circle and the graduations are below the surface, protecting them from wear. The Vernier reads to five minutes or one twelfth of a degree and a small thumb pinion provides extremely fine adjustments. Dial is clamped rigidly in position. Blade is about $\frac{1}{16}$ " thick and can be moved back and forth and clamped independently of the dial. Extra blades can be furnished.

With 6" Blade	No. 599-496-6	\$37.00
Case	No. 599-493-9998	3.75
With 12" Blade	No. 599-496-12	39.00
Case	No. 599-493-9999	5.00

498 Universal Bevel

Case and tongue of this bevel are each 3" long and $\frac{1}{32}$ " wide. Long slot in case and slot in tongue with an off-set enable the user to get angles that cannot be obtained with a conventional bevel having only a straight slot in the tongue.

No. 599-498 \$4.25

499 Universal Bevel

Case is 3" long. Both case and tongue are $\frac{1}{32}$ " wide. Long case slot and offset tongue are advantageous for many settings.

No. 599-499 \$4.25

500 Combination Bevel

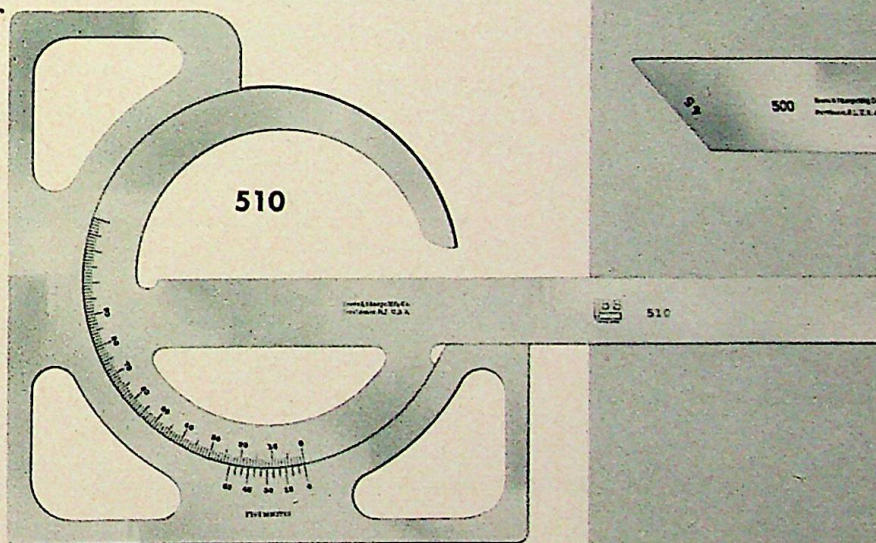
For transferring any angle from one surface to another. Also for laying out angles. Body is 4" long. Slotted blade swings to any angle and is clamped by knurled nut. Auxiliary blade is attached quickly to slotted blade and clamped in position by knurled nut. One end of body is square and other end beveled to 45°. Auxiliary blade is beveled to 60° on one end and to 30° on the other.

No. 599-500 \$4.25

510 Draftsman's Protractor Length of blade, 8 1/2"

This Protractor can be set quickly to any angle, used either side up and on either of the two outside edges of the frame. It can be used to advantage in dividing a circle, transferring angles or laying off a given angle, without resetting, on either side of a line. The Vernier reads to five minutes. Dull nickel plated finish protects protractor from rusting and prevents glare.

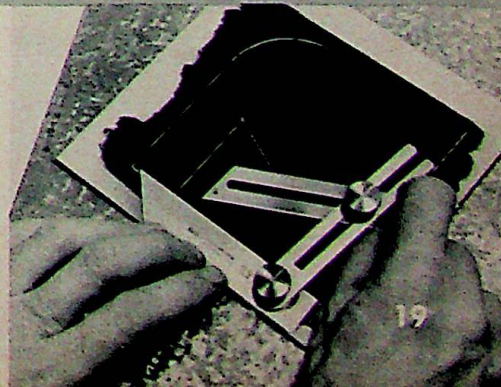
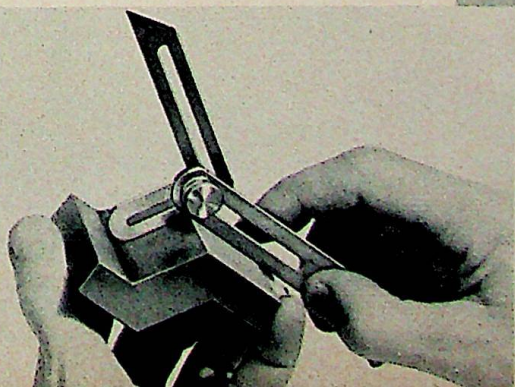
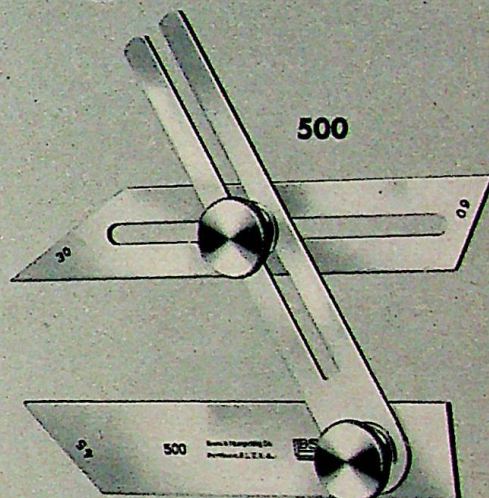
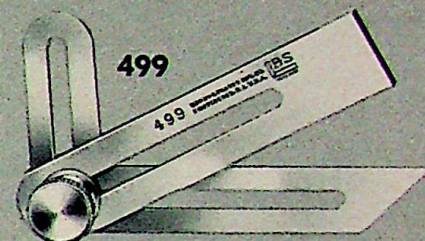
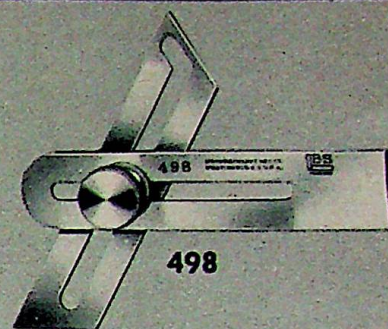
Case	No. 599-510	\$30.00
	No. 599-510-9999	4.50



Below Left—Draftsman's Protractor is being used in connection with a T square. This tool can be used on both of its edges, giving angular settings in almost unlimited variations.

Below Center—The long slot in the short arm of this bevel extends the scope of its work and facilitates its adjustment.

Below Right—The combination bevel with its auxiliary arm permits a wide range of use. Here it is being used to establish layout lines on flat stock.



BROWN & SHARPE *Straight Edges and*

Features of Brown & Sharpe Straight Edges

Brown & Sharpe Straight Edges are unexcelled for use in accurately drawing straight lines and for checking surfaces for straightness. They are made carefully on specialized equipment and each straight edge is checked for conformity to a master. Only the highest grade of tool steel is used.

36" sizes and larger are marked at two balancing points with arrows. Straight Edges so marked should be suspended at these points to preserve their accuracy and counteract any tendencies toward deflection caused by their length and weight.

526 Beveled Steel Straight Edges

One edge only beveled $\frac{1}{16}$ " in thickness. Not hardened.

12" long, $1\frac{3}{8}$ " wide, $\frac{3}{16}$ " thick	No. 599-526-12	\$ 4.50
24" long, $1\frac{1}{2}$ " wide, $\frac{1}{8}$ " thick	No. 599-526-24	10.25
36" long, $2\frac{1}{8}$ " wide, $\frac{9}{32}$ " thick	No. 599-526-36	17.25
48" long, $2\frac{1}{2}$ " wide, $\frac{3}{16}$ " thick	No. 599-526-48	24.25
60" long, 3" wide, $\frac{1}{4}$ " thick	No. 599-526-60	34.75
72" long, 3" wide, $\frac{5}{16}$ " thick	No. 599-526-72	47.50

527 Hardened Steel Straight Edges

Hardened on edges to resist wear and bruises. For hard and continuous service.

3 $\frac{3}{4}$ " long, $1\frac{1}{16}$ " wide, $\frac{1}{16}$ " thick	No. 599-527-3	\$ 1.50
7" long, $1\frac{1}{8}$ " wide, $\frac{3}{64}$ " thick	No. 599-527-7	2.70
13 $\frac{3}{4}$ " long, $2\frac{1}{16}$ " wide, $\frac{5}{64}$ " thick	No. 599-527-13	6.00
20" long, $2\frac{7}{8}$ " wide, $\frac{1}{4}$ " thick	No. 599-527-20	10.50
27" long, 3" wide, $\frac{1}{4}$ " thick	No. 599-527-27	13.50
39" long, $3\frac{5}{8}$ " wide, $\frac{1}{8}$ " thick	No. 599-527-39	22.50

Special long Straight Edges made on request.

528 Standard Steel Straight Edges Not hardened.

6" long, 1" wide, $\frac{5}{64}$ " thick	No. 599-528-6	\$ 1.15
12" long, $1\frac{1}{4}$ " wide, $\frac{3}{64}$ " thick	No. 599-528-12	2.70
18" long, $1\frac{3}{4}$ " wide, $\frac{5}{64}$ " thick	No. 599-528-18	4.10
24" long, $1\frac{3}{4}$ " wide, $\frac{5}{64}$ " thick	No. 599-528-24	6.00
36" long, 2" wide, $\frac{3}{32}$ " thick	No. 599-528-36	10.00
48" long, $2\frac{1}{2}$ " wide, $\frac{3}{32}$ " thick	No. 599-528-48	16.50
60" long, 3" wide, $\frac{1}{4}$ " thick	No. 599-528-60	24.00
72" long, 3" wide, $\frac{1}{4}$ " thick	No. 599-528-72	33.75

530 Toolmakers' Knife-Edge Straight Edges

For extreme accuracy. Testing edge is very narrow and of semicircular cross section providing a line contact that discloses even minute curvatures and provides an accurate test even if straight edge is not held exactly at right angles to surface being tested. High grade tool steel, seasoned to remove internal strains. Hardened.

2 $\frac{1}{4}$ " long, $\frac{13}{16}$ " wide	No. 599-530-2	\$ 5.50
3 $\frac{1}{4}$ " long, $\frac{13}{16}$ " wide	No. 599-530-3	7.50
4 $\frac{1}{2}$ " long, $\frac{13}{16}$ " wide	No. 599-530-4	9.50
6 $\frac{1}{4}$ " long, $\frac{13}{16}$ " wide	No. 599-530-6	14.00

531 Toolmakers' Knife-Edge Straight Edge Set

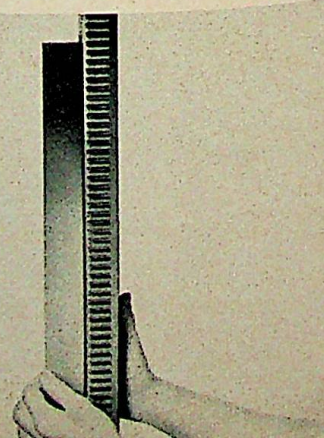
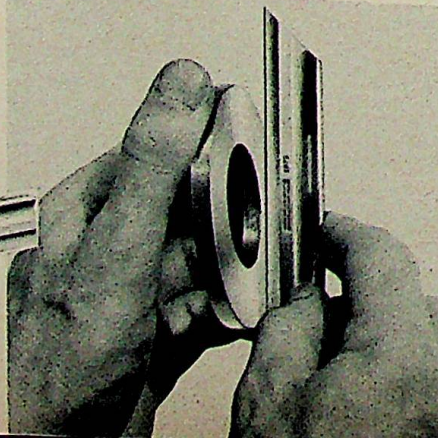
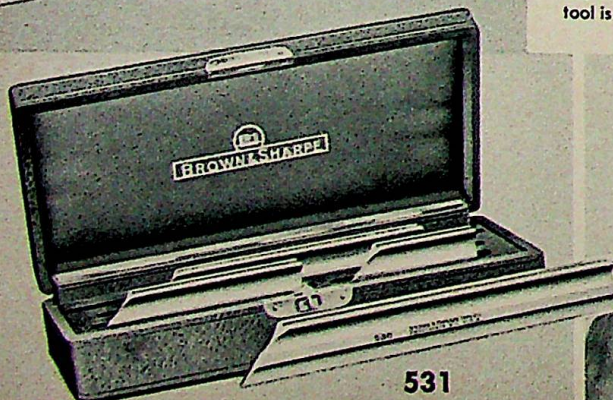
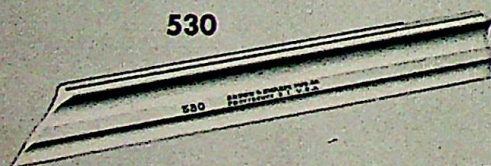
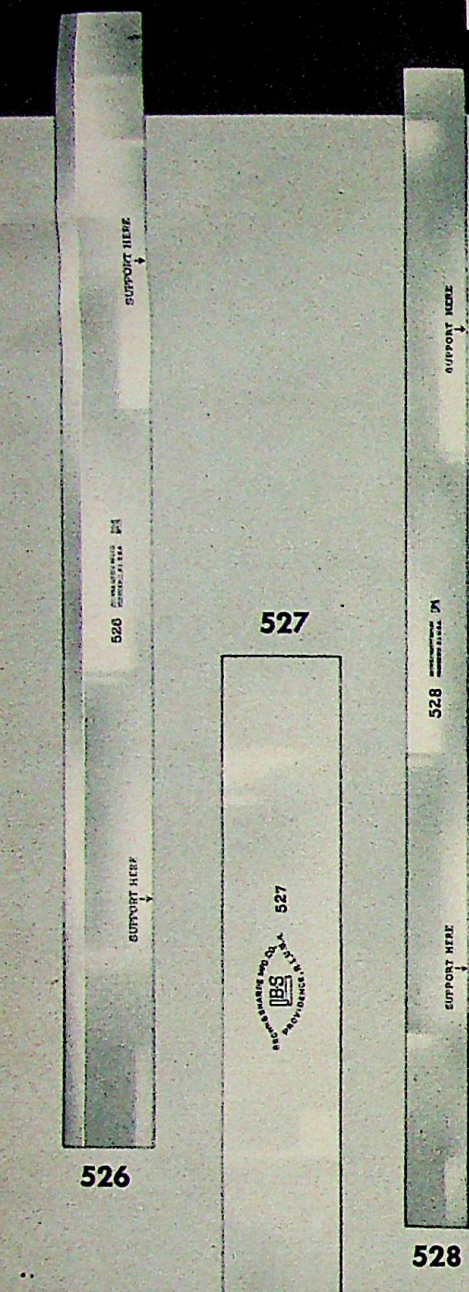
Includes the four 530 Straight Edges with Glass Test Bar in Case. Test bar also has individual case.

No. 599-531 \$50.00

Glass Test Bar In Case, Cases for Set and Individual Straight Edges can be furnished separately.

Knife-Edge Straight Edges are the very finest. Edge has semicircular shape, providing line contact even if tool is not held at right angles with testing surface.

Long straight edges provide a sure way of testing the trueness of a long machined surface or other long parts.



Squares—for Unexcelled Accuracy

Features of Brown & Sharpe Squares

Brown & Sharpe Squares are fine precision tools and are true right angles, both inside and outside. Their manufacture entails the use of many special machines, fixtures and processes. Beams and edges of blades are ground accurately for straightness and parallelism. Only the highest grade tool steel is used in their manufacture. Before the squares are assembled the blades are seasoned in order to remove internal strains and prevent inaccuracies from developing in the finished tool. Special equipment is used when inspecting the squares.

As the sides of the blades are not working surfaces they are not held precisely at right angles with the bottom of the beams and, in using a square, blade should be held flat against work so that the face and not a corner of blade contacts the work. This eliminates the possibility of error which might be caused by any slight lateral deviation of blade.

540 Hardened Steel Squares

Beams and edges of blades are hardened.

3" Blade, 2 $\frac{7}{16}$ " Beam	No. 599-540-3	\$ 7.50
4 $\frac{1}{2}$ " Blade, 3 $\frac{9}{16}$ " Beam	No. 599-540-4	10.50
6" Blade, 4 $\frac{3}{8}$ " Beam	No. 599-540-6	13.50
12" Blade, 7 $\frac{1}{8}$ " Beam	No. 599-540-12	29.50
18" Blade, 10 $\frac{1}{4}$ " Beam	No. 599-540-18	58.25

Cases can be furnished for above.

541 Hardened Steel Squares

Very rigid. Beams and edges of blades hardened. Furnished in wooden case.

24" Blade, 13 $\frac{1}{8}$ " Beam	No. 599-541-24	\$ 96.00
36" Blade, 19 $\frac{1}{2}$ " Beam	No. 599-541-36	205.00

Above also furnished without cases.

542 Hardened Steel Squares with Beveled Edges

For most exacting work. Blades, beveled on both edges of each side, make practically line contact with work. Beams and blade edges hardened.

3" Blade, 2 $\frac{7}{16}$ " Beam	No. 599-542-3	\$ 9.50
4 $\frac{1}{2}$ " Blade, 3 $\frac{9}{16}$ " Beam	No. 599-542-4	13.50
6" Blade, 4 $\frac{3}{8}$ " Beam	No. 599-542-6	17.00

Cases can be furnished for above.

547 Thin Steel Square

Accurate for squareness on inner and outer edges. Machine divided graduations both sides to 16ths and 32nds. Not hardened.

6" Blade, 1" wide	No. 599-547-6	\$7.75
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550 Steel Square for Millwrights

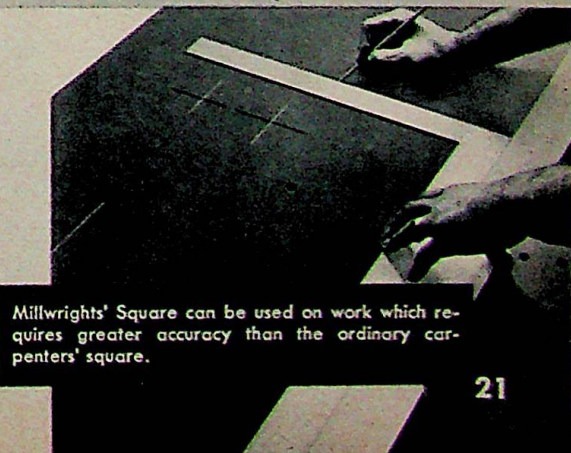
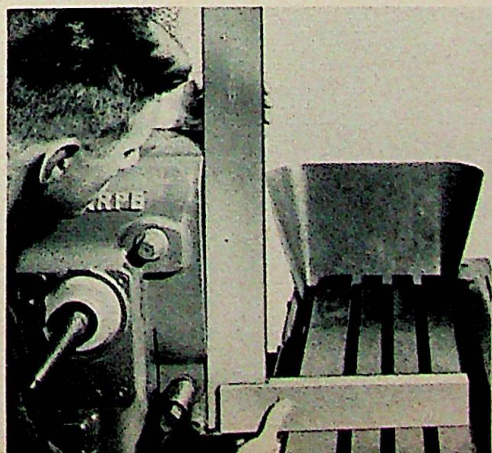
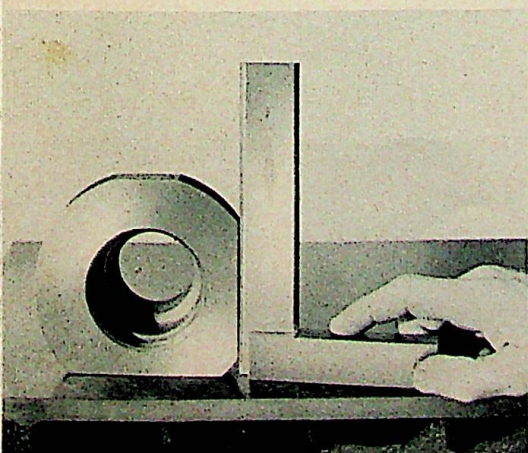
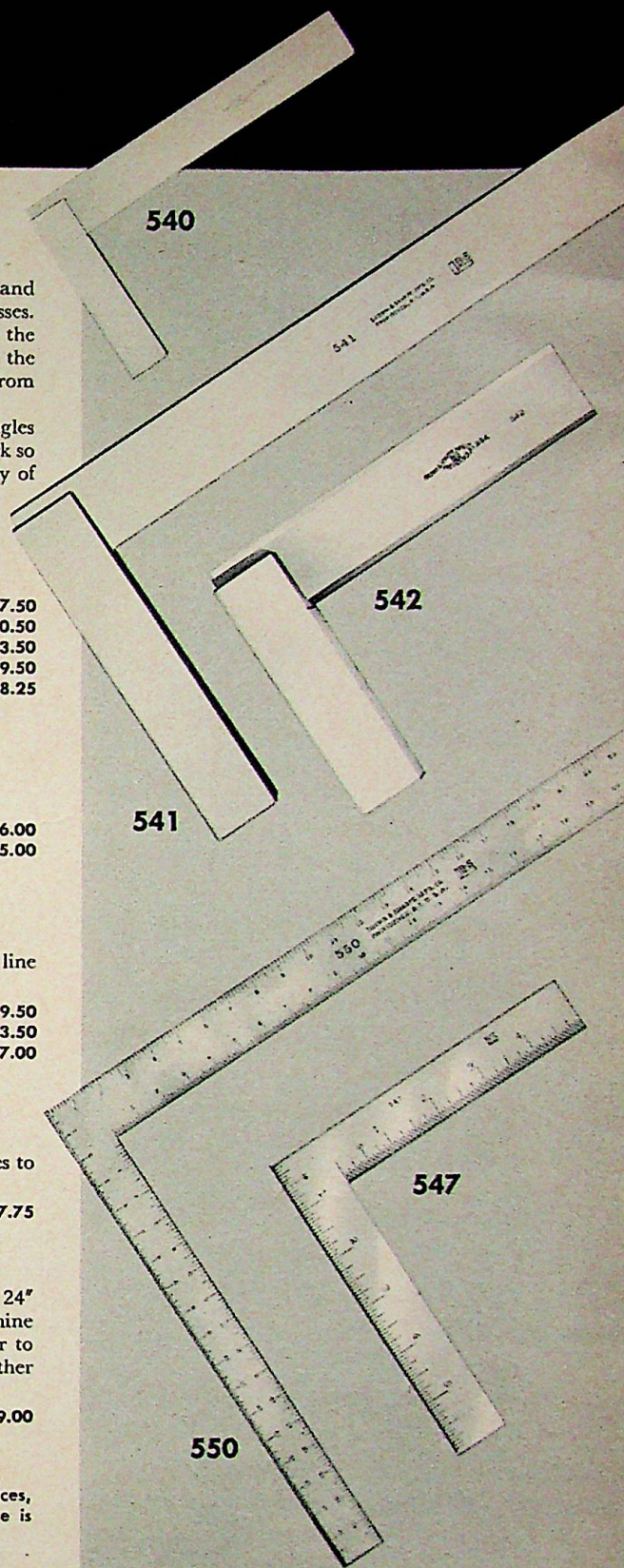
Meets the needs of those requiring a more accurate tool than ordinary carpenters' square. 24" long blade, 2" wide; 18" short blade, 1 $\frac{1}{2}$ " wide. Accurate inner and outer 90° angles. Machine divided graduations, are made heavy for easy reading. Blades, $\frac{1}{8}$ " thick at corner, taper to $\frac{1}{16}$ " at ends. Both sides have one inside and one outside edge graduated in 8ths; the other edges in 16ths. One inside and outside edge has last inch in 64ths; preceding inch in 32nds.

Not hardened.

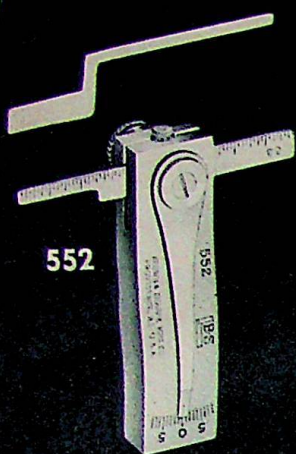
No. 599-550	\$29.00
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The semicircular testing edge of 542 Square provides a line contact even if square is held at a slight angle with the tested surface.

For testing the squareness of large surfaces, 541 is a precise tool. This large square is very rigid and made carefully.

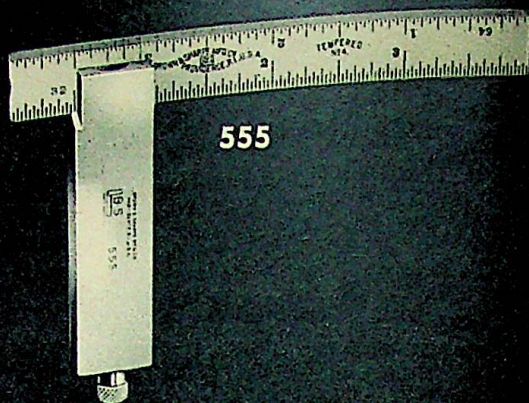
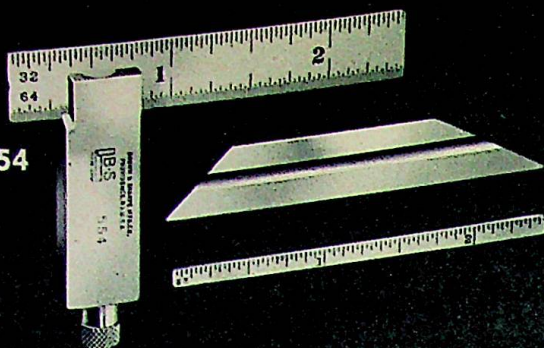


Millwrights' Square can be used on work which requires greater accuracy than the ordinary carpenters' square.



552

554



555

BROWN & SHARPE

Diemakers' and Adjustable Squares

552 Die Makers' Square

For measuring die clearances, determining drafts on patterns, etc. Blade is locked in position by a small clamp screw and can be set for any angle up to 8° either side of zero. Graduations show setting in degrees. Clamp screw on back of square locks setting. Straight blade is $2\frac{1}{4}$ " long, $\frac{1}{32}$ " wide (except for $\frac{3}{8}$ " on one end where it is narrowed to $\frac{1}{64}$ ") and graduated for 1" on each end—in 32nds on one end and 64ths on the other. Offset blade for unobstructed view, $\frac{1}{8}$ " wide, is beveled on both sides of each edge. Remainder of blade, $\frac{1}{32}$ " wide, fits into body of square.

No. 599-552

\$8.75

554 Adjustable Square

Useful on small work. Tempered blades may be adjusted longitudinally, held accurately in body, and reversed easily. Wide blade, $2\frac{1}{2}$ " long, is graduated on one side, one edge in 32nds and the other in 64ths. Blade with beveled ends is for establishing 60° and 45° angles. Narrow blade, $\frac{1}{8}$ " wide, is graduated on one side in 32nds. Beam is hardened and ground.

No. 599-554

\$6.75

555 Adjustable Square

Answers the requirement for a reliable square with a 4" adjustable blade. Blade is adjustable longitudinally, held firmly in accurate alignment and reversed easily. Tempered blade is graduated in 8ths, 16ths, 32nds and 64ths. Beam is hardened and ground.

No. 599-555

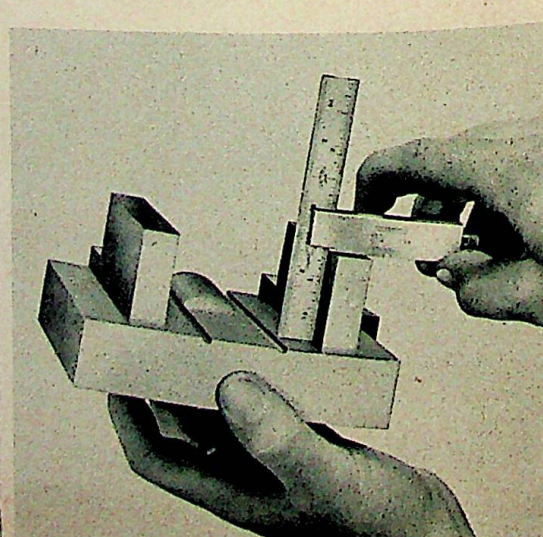
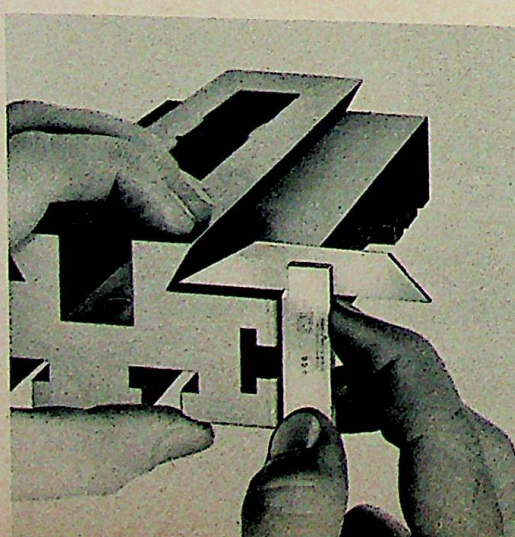
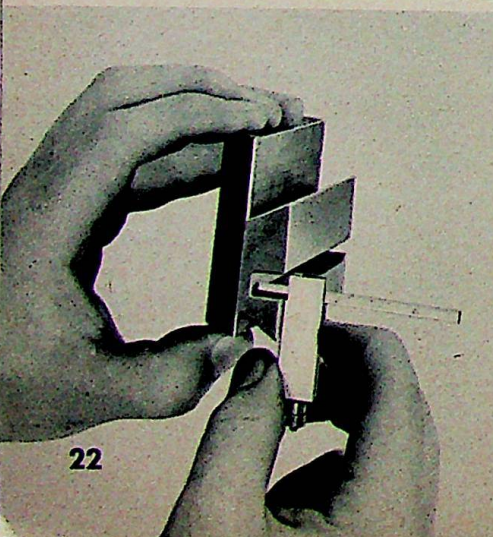
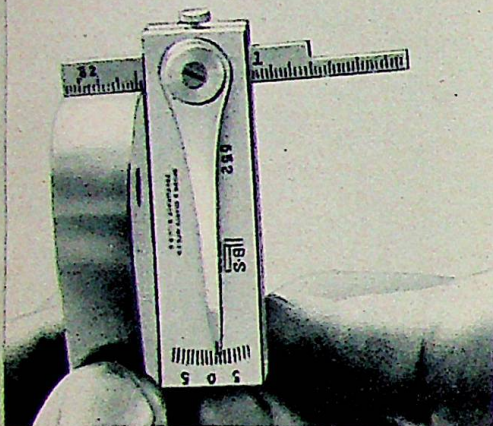
\$8.25

Upper Left—With straight blade, 552 determines clearance angle and measurement in one operation.
Left Center—With the offset blade, 552 permits unobstructed view for accurate sighting.

Lower Left—554 with narrow blade can be used as a square or a depth gage in small holes and slots.

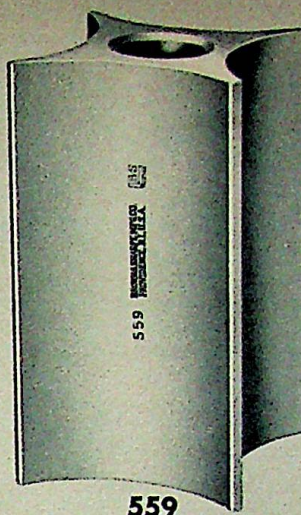
Bottom Center—554 with beveled blade is extremely useful for checking squareness of surfaces too confined to permit the employment of a regular blade.

Lower Right—555 permits checking of square surfaces up to full capacity of its 4" adjustable blade.



BROWN & SHARPE

Toolmakers' Surface Plate Square

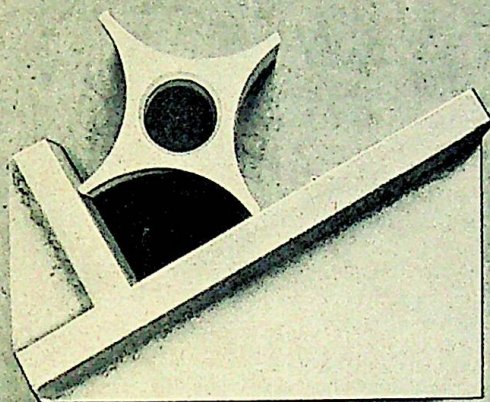


559

559 Toolmakers' Surface Plate Square

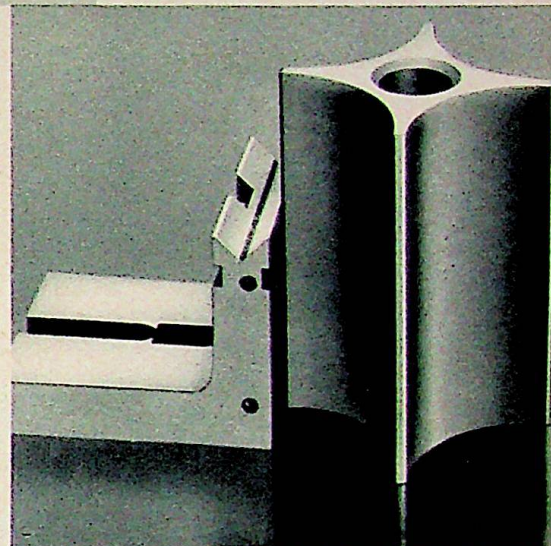
Substantial and strong, and of convenient one-piece form for use on a surface plate. Made of hardened steel, 4" high, and $2\frac{1}{2}$ " between opposite edges. Both ends are square with all four edges.

No. 599-559 \$14.75



At Right—559 is being used on a surface plate, checking the squareness of a knee.

At Left—Airplane view shows 559 square used to check several surfaces for squareness at one time.



Reading the Vernier

Cuts show the Vernier used with a scale which is graduated into 40ths or .025ths of an inch. The Vernier has 25 divisions which are numbered every 5th division and which equal, in extreme length, 24 divisions on the scale, or $24 \times 1/40" = 24 \times .025" = .600"$. Thus, one division on the Vernier equals $1/25$ of $.600" = .024"$. Therefore, the difference between a division on the Vernier and a division on the scale = $.025" - .024" = .001"$.

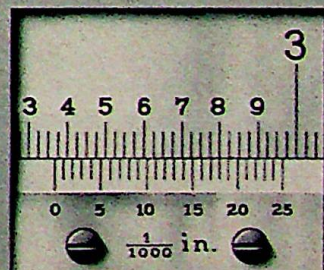
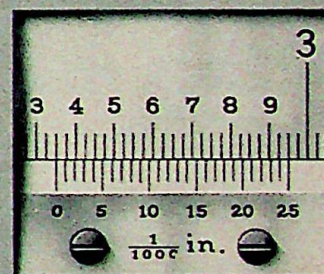
When the reading is exact, with respect to the number of fortieths of an inch, the zero on the Vernier coincides with a graduation on the scale—either inch, tenth or fortieth, as the case may be. This leaves a space between lines on the scale and the 1, 2, 3, 4, 5, 6, etc. lines on the Vernier of .001", .002", .003", .004", .005", .006", etc., respectively, the difference increasing .001" at each Vernier division in numerical order until, at the 25th graduation, the lines again coincide (see upper cut).

Thus, when the 1st, 2nd or 3rd, etc. line on the Vernier coincides with a line on the scale, the zero on the Vernier has moved 1, 2 or 3, etc. thousandths of an inch past the previous fortieth graduation to bring these lines together.

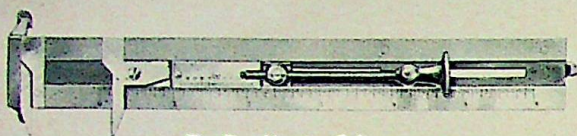
To read—Note the inches, tenths and fortieths of an inch that the zero on the Vernier has moved from the zero on the scale and to this reading add the number of thousandths indicated by the line on the Vernier that coincides with a line on the scale.

Example:—The upper cut shows the zero graduation on the Vernier coinciding with a fortieth graduation on the scale (the second fortieth beyond an even tenth graduation). This indicates that the reading is exact with respect to the fortieths of an inch. The reading therefore equals $2.000" + .300" + .050" = 2.350"$. The lower cut, however, shows the 18th Vernier graduation coinciding with a line on the scale. This indicates that .018" should be added to the scale reading. The reading, then, equals $2.000" + .300" + .050" + .018" = 2.368"$.

Verniers with 25 divisions are used on all Brown & Sharpe Verniers with the exception of Gear Tooth Verniers 580, 20 to 2 diametral pitch, on which Verniers with 20 divisions are used.



BROWN & SHARPE—



The First Vernier Caliper

The Vernier was invented by Pierre Vernier in 1631. It consists of a small scale having a certain number of graduations which equals in combined length, a different number of graduations, usually one more or one less, on the long scale of the tool. It is evident that if, in the same extreme length, the Vernier has divisions greater or less in number by one than the scale, there is a small difference between a division on the Vernier and a division on the scale. The readings depend upon the difference between the Vernier and the scale divisions. Utilizing this principle, Joseph R. Brown invented the Vernier Caliper in 1851, the first functional tool within reach of the machinist for measuring in .001". This tool which contributed much to the early maintenance of accuracy is shown above.

Features of Brown & Sharpe Vernier Tools

Brown & Sharpe Vernier Tools have machine-divided graduations which are extremely accurate in their spacing. The lines are cut evenly, not etched, and are clear and of uniform width and depth, essential to the accurate matching of the graduations on the Vernier plate with scale.

Great care is taken in the selection of materials and workmanship. The Vernier slides are fitted tightly and smoothly to prevent error at the measuring points, and a specially designed gib maintains alignment and resists deflection. The hardening and lapping of measuring surfaces are performed painstakingly.

All Vernier Calipers and Height Gages are tested and adjusted carefully in our gage laboratory which is kept at 68°F.

570 Vernier Calipers Read by .001"

Take outside measurements direct from one side of bar; inside from the other. Jaws are hardened. Bars and slides have points for setting dividers on 6", 12" and 24" sizes. A $\frac{1}{4}$ " Plug Gage, Class Z, can be furnished as an extra for testing adjustment of the caliper. Furnished in cases.

Size	Jaws, Length	Width, Jaws Closed		
6"	1 $\frac{1}{4}$ "	$\frac{1}{4}$ "	No. 599-570-6	\$44.25
12"	2 $\frac{1}{4}$ "	3/10"	No. 599-570-12	55.85
24"	2 $\frac{1}{4}$ "	3/10"	No. 599-570-24	98.75
36"	2 $\frac{3}{4}$ "	$\frac{1}{2}$ "	No. 599-570-36	163.85
48"	3 $\frac{1}{2}$ "	$\frac{3}{4}$ "	No. 599-570-48	294.75

Available, also, without cases. Larger sizes furnished to order.

573 Center and Small Hole Attachment Set

For Brown & Sharpe 6" Vernier Calipers. Center Points convert caliper into a precision divider. Small Hole Points permit measurement between small holes. Small point .025" radius; large .050". Furnished in case.

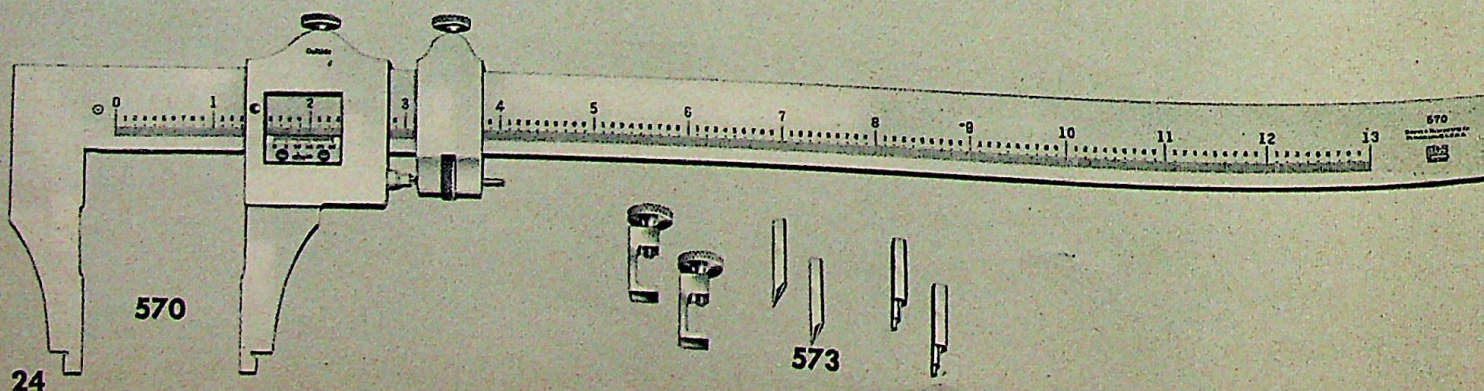
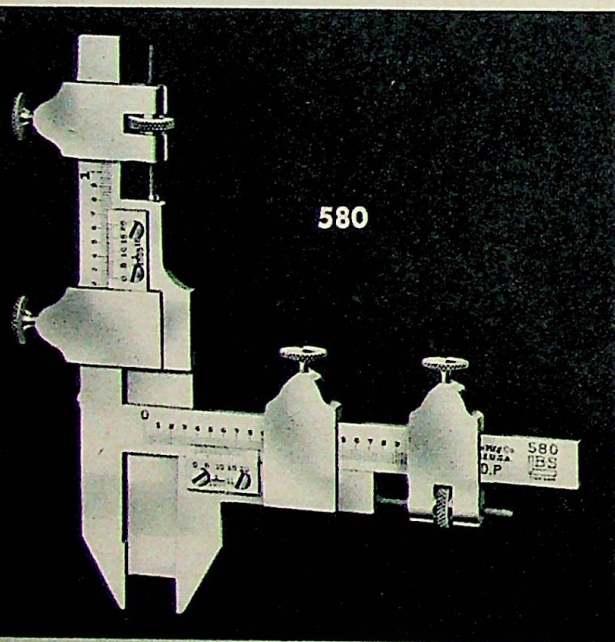
No. 599-573-6 \$23.00

580 Gear Tooth Verniers Read by .001"

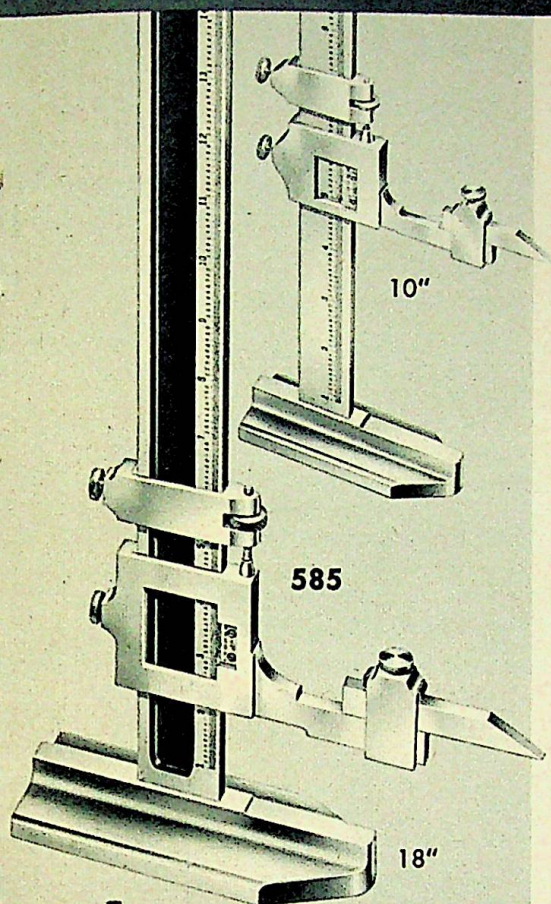
Measure thickness at pitch line or chordal thickness of gear teeth and distance from top of tooth to chord. Thickness of tooth and addendum are measured respectively by the sliding jaw and the tongue, which have adjusting screws. Furnished in cases.

20 to 2 Diam. Pitch	No. 599-580-2	\$82.50
10 to 1 Diam. Pitch	No. 599-580-1	115.50

Available, also, without cases. Furnished also with Tungsten Carbide Measuring Tips. Consult factory.



The Verniers with MACHINE-CUT Graduations



585 Vernier Height Gages Read by .001"

Measure vertical distances from a plane surface. Essential to accurate jig and fixture work. Dial Attachments 725 and 725A, page 34 are very useful with these height gages. Bottom of bases are ground and lapped. Furnished in cases.

10" Measures $1\frac{1}{8}$ " to 10" No. 599-585-1030 \$74.00
18" Measures $1\frac{1}{2}$ " to 18" No. 599-585-1830 158.50
24" Measures $1\frac{7}{8}$ " to 24" No. 599-585-2430 295.00

Available, also, without cases. Larger sizes furnished to order.

585A and 585B Depth Gage Attachments

For Brown & Sharpe Vernier Height Gages. Convert height gages into precision depth gages.

585A 7" long for 10" Gages No. 599-585-7 \$4.00
585B 10" long for 18" and 24" Gages No. 599-585-10 6.25

585C and 585D Offset Markers

For Brown & Sharpe Vernier Height Gages. Extend usefulness of Height Gages. Can be used in inverted position also.

585C 3" long for 10" Gages No. 599-585-3 \$3.60
585D 4" long for 18" and 24" Gages No. 599-585-4 6.00

585E Tungsten Carbide Marker

For 10" Vernier Height Gages. For marking layout lines on glass, hardened steel or other hard materials.

No. 599-585-5 \$8.50

590 Telescoping Gages $\frac{1}{2}$ " to 6"

Handle $3\frac{3}{4}$ ". Convenient for internal measurements with a micrometer caliper. Only small leg telescopes. Handle always in most sensitive position. Heads do not fly apart and become lost when handle is removed.

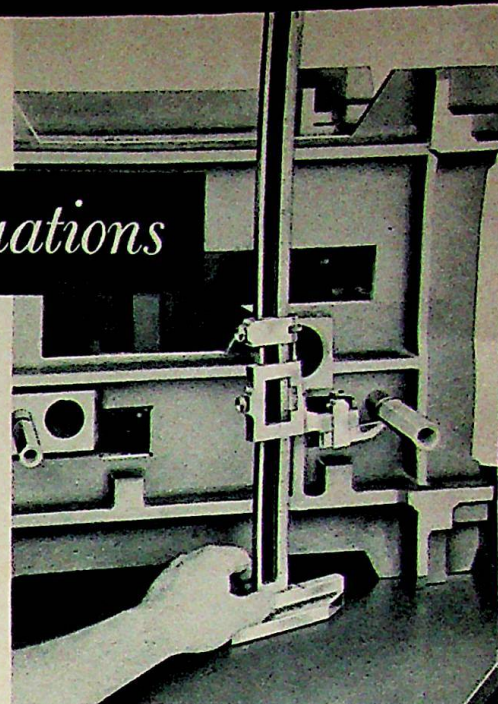
Set of 5 Heads and $\frac{3}{4}$ " Handle No. 599-590 \$17.75
9" Handle only No. 599-590-8 4.50

Heads and handle also available individually.

598 Height Gage Attachment

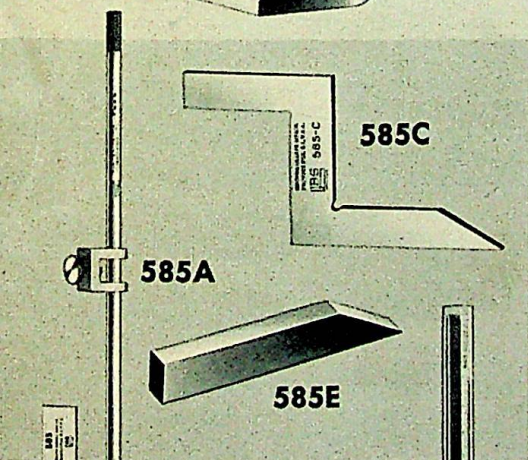
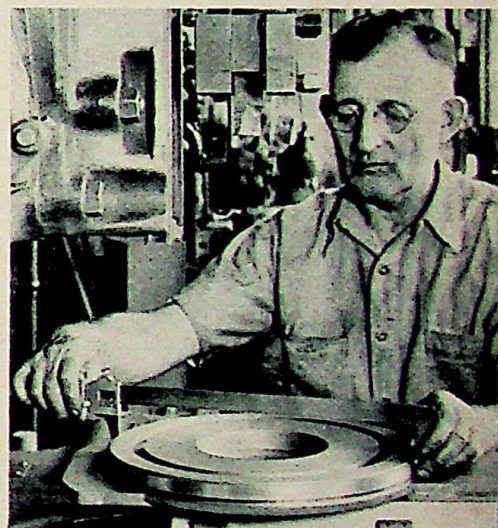
For Inside Micrometers 260 and 261.

No. 599-598 \$4.25



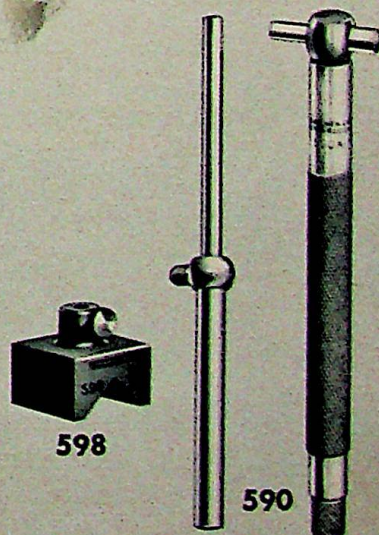
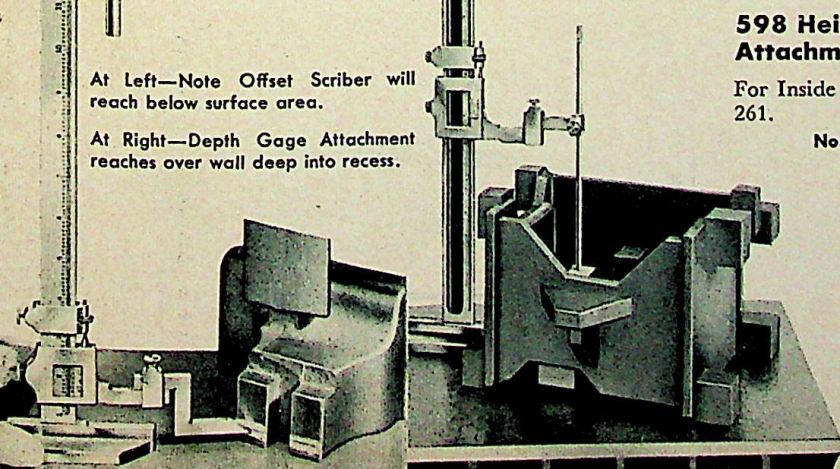
Above—Always be sure bottom of base is clean and free from burrs. Advance marker to work slowly for sensitive contact.

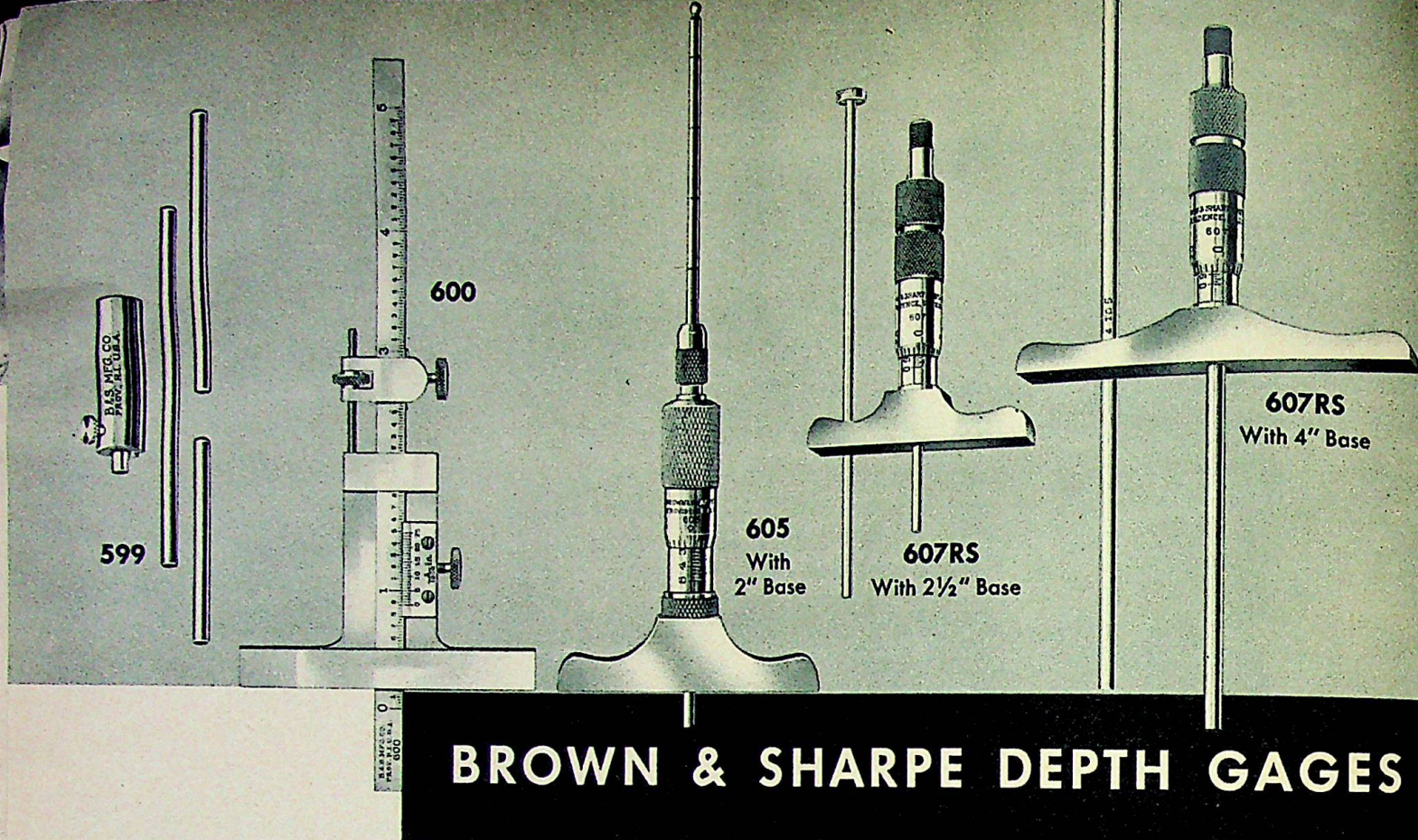
Below—Vernier Calipers provide reliable accurate measurement over broad size ranges.



At Left—Note Offset Scriber will reach below surface area.

At Right—Depth Gage Attachment reaches over wall deep into recess.





BROWN & SHARPE DEPTH GAGES

599 Depth Gauge 0 to 2"

Has 4 measuring rods. Useful for measuring distances between shoulders and flanges from 1" to 3" as well as depths. In measuring depths, one inch, the length of body, is subtracted from micrometer reading over length of body and exposed section of rod. Body is hardened and ground. Rods are polished.

No. 599-599 \$3.75

600 Vernier Depth Gages 6", or 6" and 12" blades. Read by .001"

For obtaining accurate depth measurements of holes, recesses in dies, etc. Blade $\frac{1}{4}$ " wide. 6" blade measures to 3 $\frac{1}{2}$ ". 12" blade to 9 $\frac{1}{2}$ ". Furnished in cases.

With 6" blade No. 599-600-630 \$28.00
With 6" and 12" blades No. 599-600-1230 42.00

Available, also, without cases.

605 Micrometer Depth Gages 0 to 2 $\frac{1}{2}$ " by .001"

Have 2" or 4" base (gage with 2" base shown). Micrometer screw has $\frac{1}{2}$ " movement. Adjustable measuring rod provides range of measurement. Rod has graduations each half inch which receive clamping

fingers at top of thimble and accurately position rod. Rods are about .100" in diameter. Ends of rods and bottom surfaces of bases are hardened.

With 2" Base No. 599-605-2000 \$15.00
With 4" Base No. 599-605-4000 16.00

Cases can be furnished.

607 and 607RS Micrometer Depth Gages

Ranges 0 to 3", 0 to 6", 0 to 9", and 3" to 9" by .001"

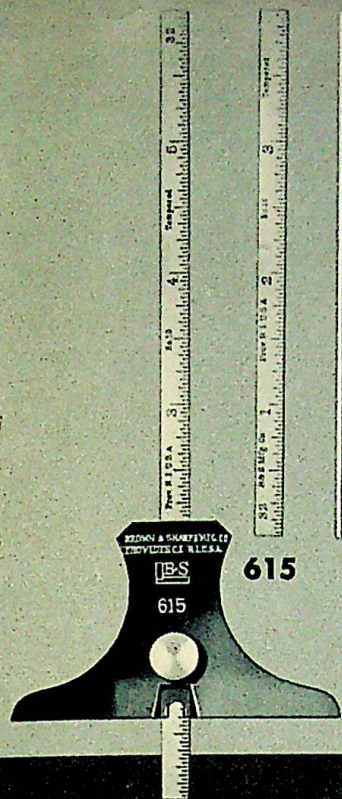
Have 2 $\frac{1}{2}$ " or 4" base. Micrometer screw has 1" movement. Range of measurement provided by different rods furnished. Rods for gages 0 to 3", and 0 to 6" are $\frac{1}{8}$ " in diameter; those for gages 0 to 9" and 3" to 9" are $\frac{3}{16}$ " in diameter. Ends of all rods and bottom surface of bases are hardened. To change rods merely remove thimble cap and insert rod for required measurement. Thimble holds rod securely in place.

607	0 to 3"	2 $\frac{1}{2}$ " Base	3 Rods	No. 599-607-2100	\$14.85
607	0 to 3"	4" Base	3 Rods	No. 599-607-4100	18.75
607	0 to 6"	2 $\frac{1}{2}$ " Base	6 Rods	No. 599-607-2200	22.75
607	0 to 6"	4" Base	6 Rods	No. 599-607-4200	26.85
607	0 to 9"	4" Base	9 Rods	No. 599-607-4300	31.25
607	3" to 9"	4" Base	6 Rods	No. 599-607-4400	24.75

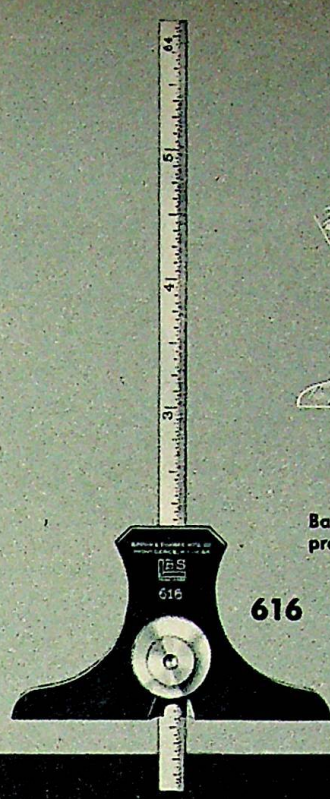
Depth Gauge 599 is a handy little tool for measuring depths, recesses and other small distances.

The Vernier Depth Gauge provides a precise measurement in .001" in holes and recesses.

The convenient base shape of this Micrometer Depth Gauge permits holding securely against a surface from which a measurement is taken.

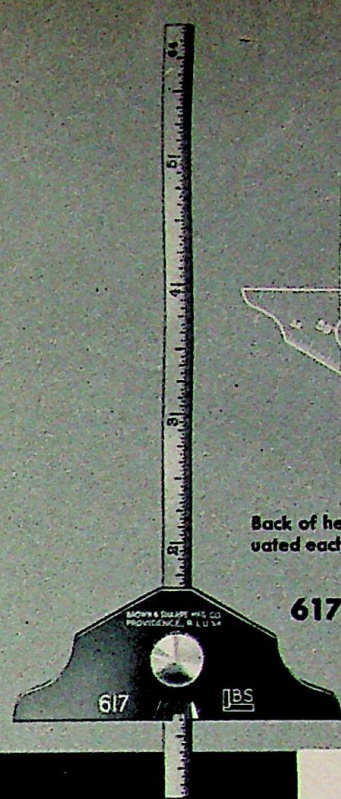


615



616

Back side of head has protractor graduations



617

Back of head is graduated each side of rule

Micrometer, Vernier and Rule... a Style for Every Purpose

607 and 607RS Micrometer Depth Gages, Continued

607RS 0 to 3" 2 1/2" Base 3 Rods Has ratchet stop No. 599-607-2120	\$15.60
607RS 0 to 3" 4" Base 3 Rods Has ratchet stop No. 599-607-4120	19.50
607RS 0 to 6" 2 1/2" Base 6 Rods Has ratchet stop No. 599-607-2220	23.50
607RS 0 to 6" 4" Base 6 Rods Has ratchet stop No. 599-607-4220	27.60
607RS 0 to 9" 4" Base 9 Rods Has ratchet stop No. 599-607-4320	32.00
607RS 3" to 9" 4" Base 6 Rods Has ratchet stop No. 599-607-4420	25.50

Cases and extra Measuring Rods to extend ranges with 1/8" rods from 3" to 6" and with 3/16" rods from 0 to 3" can be furnished.

615 Rule Depth Gages

0 to 3" with 4" Rule and 4" Rod. 0 to 5" with 6" Rule or with 6" Rule and 6" Rod

Rules have No. 10 Grad., 32nds and 64ths. Head is hardened steel 2 1/2" long, 1/8" wide. Rods are 5/64" in diameter—convenient for small holes.

0 to 3", with 4" Rule and Rod	No. 599-615-42	\$3.00
0 to 5", with 6" Rule and Rod	No. 599-615-62	3.50
0 to 5", with 6" Rule only	No. 599-615-60	3.00

The Rule Depth Gage is a handy instrument for taking depth measurements where the degree of precision does not require measurements in thousandths.

616 Rule Depth Gage 0 to 5"

Adjusted easily to any angle in relation to head. Turret graduated every 10° from 0 to 90°. Rule is locked at any angle by the large clamp nut. Small clamp nut locks depth setting. Head is hardened steel and base is 2 1/2" long, 1/8" wide. 6" Rule has No. 10 Grad., 32nds and 64ths. A 303 4" Narrow Tempered Steel Rule can be used with this gage, if desired.

No. 599-616-60 \$4.00

617 Drill Point Gage and Depth Gage

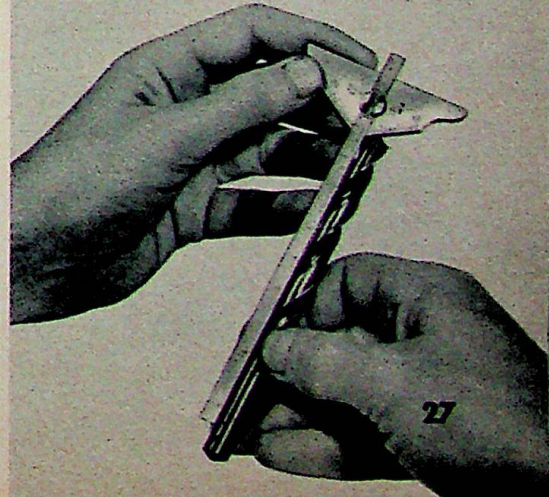
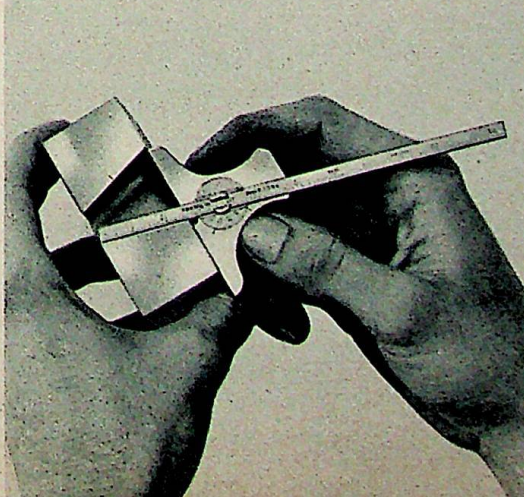
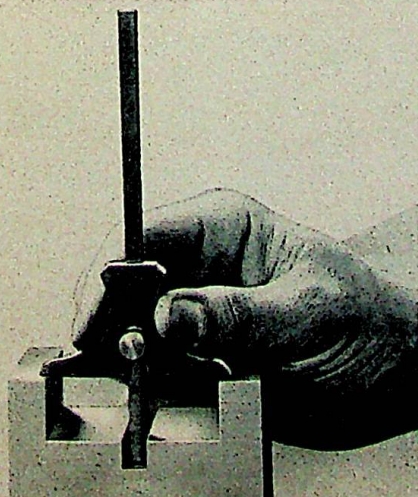
0 to 5" with 6" Rule or with 6" Rule and 6" Rod

Rule has No. 10 Grad., 32nds and 64ths. Rod is 5/64" in diameter. Useful for checking angle of drill points when sharpening them and for determining whether point is central. Also useful as a depth gage. The head is hardened steel with a base 2 1/2" long, 1/8" wide. Its top is ground carefully to angles of 59° each side of blade and accurately graduated.

With 6" Rule and Rod	No. 599-617-62	\$4.40
With 6" Rule only	No. 599-617-60	4.00

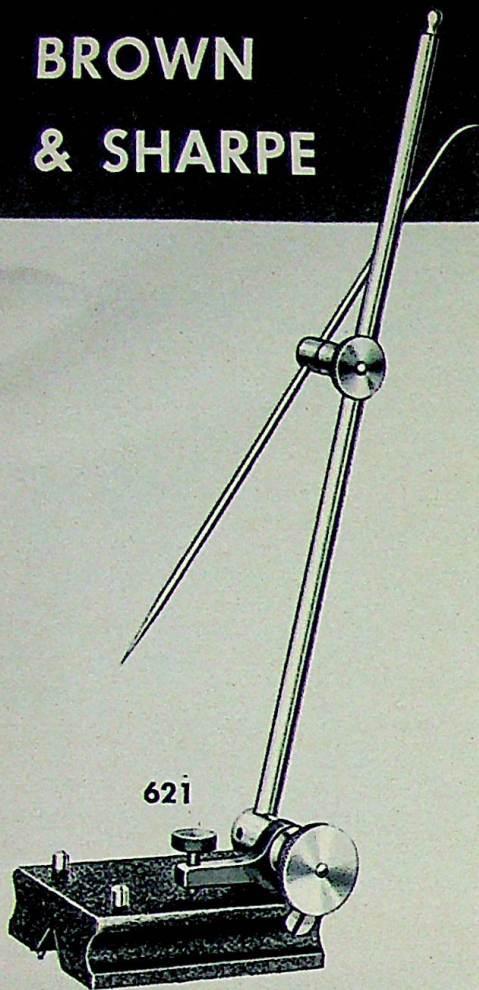
With the 616 Rule Depth Gage not only measurements of depths but of angles can be determined from 0 to 90°.

With the 617 the correct angularity of drill points can be checked in sharpening drills.



BROWN & SHARPE

Universal Surface Gages Planer and Shaper Gage



620, 621 and 622 Universal Surface Gages

Extremely versatile in use. Spindle adjusted quickly and locked at any angle above or below base. Fine adjustment is made by small knurled nut. Brown & Sharpe design permits gage to be held and adjusted with one hand. Base has V groove for cylindrical work and two gage pins for use against edge of surface plate or T slot. Scriber can be inserted in swivel bolt in place of spindle for small work. Dial Attachment 725, page 34 used with 621 and 622 tests in places inaccessible to large dial gages. Also, 621 and Universal Dial Indicator Set 740, page 36, become a useful combination as 740 swivel fits spindle of 621.

620 has Base $2\frac{1}{4} \times 1\frac{1}{2}$ " and 4" Spindle

With Base Not Hardened
With Base Hardened

No. 599-620-41	\$7.25
No. 599-620-42	8.40

621 has Base $3\frac{1}{8} \times 2\frac{1}{2}$ "

With Base Not Hardened and 9" Spindle
With Base Not Hardened and 9" and 12" Spindles
With Base Hardened and 9" Spindle
With Base Hardened and 9" and 12" Spindles

No. 599-621-91	\$7.50
No. 599-621-121	8.75
No. 599-621-92	9.75
No. 599-621-122	10.75

622 has Heavy Base $4 \times 3\frac{3}{8}$ "

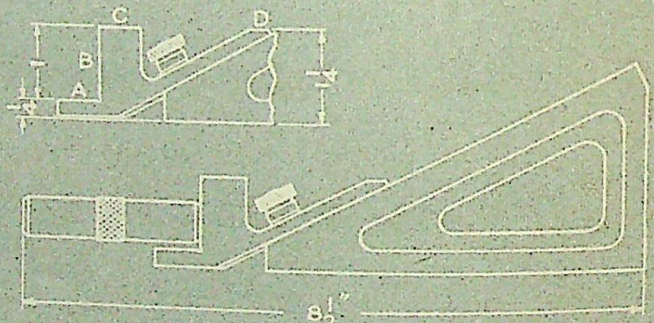
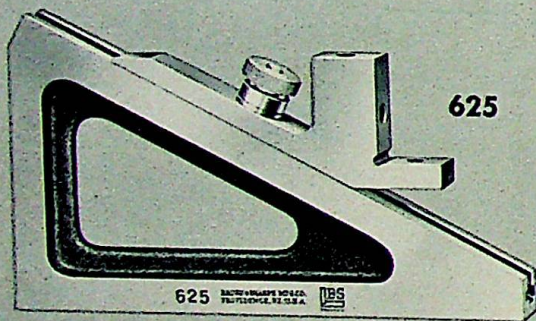
With Base Not Hardened and 12" Spindle
With Base Not Hardened and 12" and 18" Spindles
With Base Hardened and 12" Spindle
With Base Hardened and 12" and 18" Spindles

No. 599-622-121	\$10.25
No. 599-622-181	11.50
No. 599-622-122	12.00
No. 599-622-182	13.00

625 Planer and Shaper Gage

Simplifies accurate setting of cutting tools. Design of slide provides settings from $\frac{1}{4}$ " to $8\frac{1}{2}$ " with one extension. Surfaces C and D (see line illustrations) are 1.000" from surface A, a combination convenient for many settings. Extension usable on three surfaces, A, B and C, is 2.500" long. Gage can be used on its side. Base is steel forging and is hardened as are slide and extension. Working surfaces are ground.

No. 599-625 \$8.50

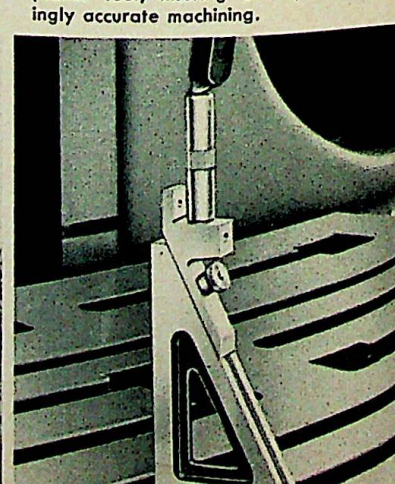
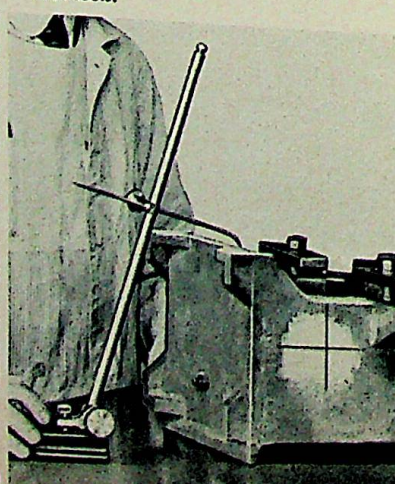
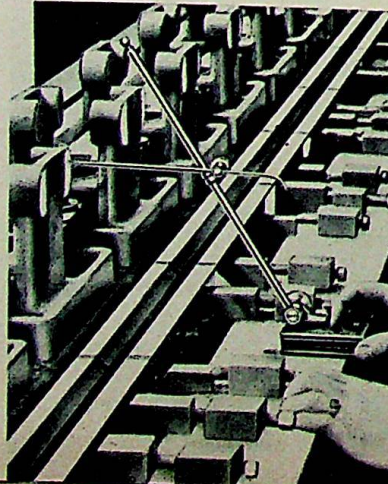
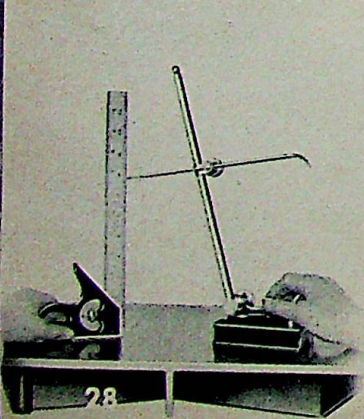


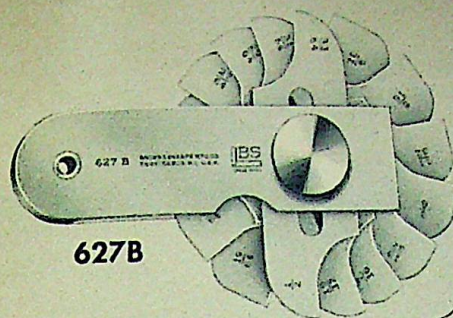
One of the handiest tools in the shop is the surface gage. Here the pointer is being set with the fine adjustment for laying out work for machining.

The gage pins in the back of the base permit the surface gage to be used against the edge of a machine table in laying out and lining up work.

A toolmaker is using this Universal Surface Gage on a surface plate to precisely locate point on fixture, a common employment of such tools.

When set to a micrometer, the Planer and Shaper Gage establishes the accurate setting of a planer tool, insuring correspondingly accurate machining.

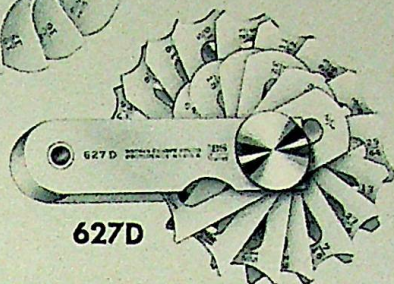




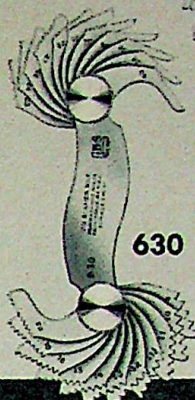
627B

All These Gages
Have Blade Lock

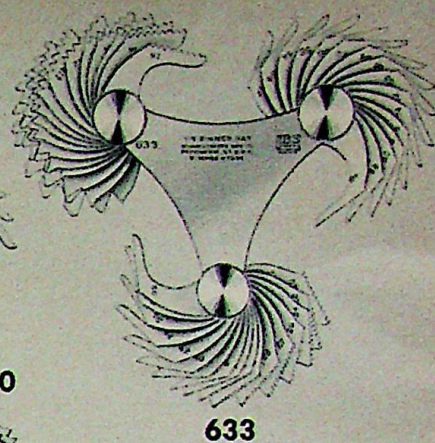
634



627D



630



633

BROWN & SHARPE

Fillet and Radius Gages ... Screw Pitch Gages

627 Fillet and Radius Gages

Long, sliding, double-ended blades facilitate use of these tools. Only half the usual number of blades required for a given range. Blades are hard rolled steel and can be clamped securely. Convex and concave radii of same size are on same blade. Two styles 627A and 627B have 8 blades of form for fillets and radii in corners or against shoulders. 627C has 15 blades and 627D 16 of form for laying out forming tools as well as for gaging fillets and radii.

627A	$\frac{1}{8}"$ to $\frac{1}{4}"$, by 64ths	No. 599-627-1	\$3.25
627B	$\frac{1}{8}"$ to $\frac{3}{16}"$, by 64ths	No. 599-627-2	3.75
627C	$\frac{1}{8}"$ to $\frac{1}{4}"$, by 64ths	No. 599-627-3	3.50
627D	$\frac{1}{8}"$ to $\frac{1}{2}"$, by 64ths	No. 599-627-4	4.75

Features of Screw Pitch Gages

Unified and
American Form



Sharp V



The blades of Screw Pitch Gages are cut deeply with 60° angle. Tops of teeth are flattened so that one blade suffices for gaging both V and present day Unified and American Threads as well as the older American National or U.S. Standard, an original Brown & Sharpe feature, and a very advantageous one. The number of threads per inch is stamped on each blade and the Blade Lock securely locks any blade or blades in position for use—a handy convenience.

630 Screw Pitch Gage 22 Pitches, 9 to 40

Includes 11½ and 27 threads per inch for pipe threads. 16 pitch blade also checks 8 P.

No. 599-630 \$2.50

631 Screw Pitch Gage 24 Pitches, 4 to 30

Similar to 630 and includes 11½ and 27 threads per inch for pipe threads.

No. 599-631 \$2.80

632 Screw Pitch Gage 30 Pitches, 4 to 42

With 11½ and 27 threads per inch for pipe threads.

No. 599-632 \$3.50

633 Screw Pitch Gage 51 Pitches, 4 to 84

For those who require wide range of pitches. Triangular shape compactly houses 51 blades. Includes 11½ and 27 threads per inch for pipe threads.

No. 599-633 \$5.50

634 Screw Pitch Gage 22 Pitches, 32 to 74

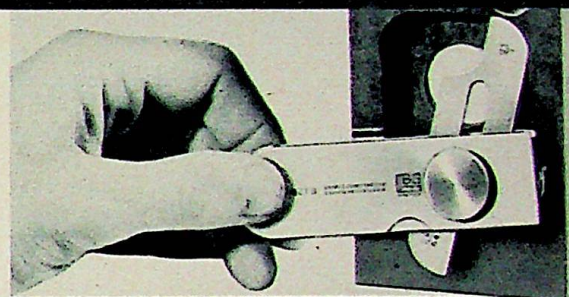
For those using fine threads.

No. 599-634 \$2.35

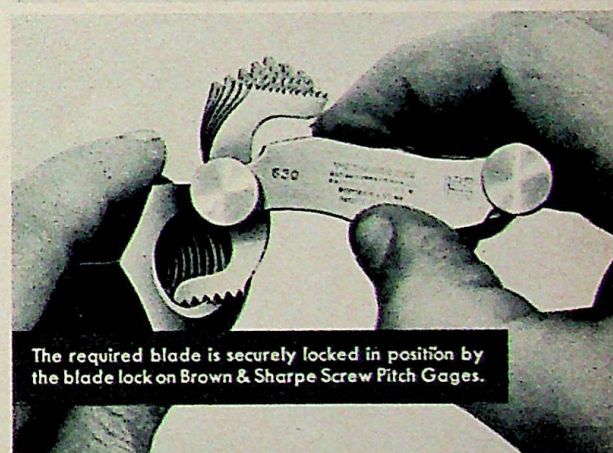
635 Screw Pitch Gage 25 Pitches, 2¼ to 20

Similar to 634 but for coarse threads. Includes gage for grinding thread tools.

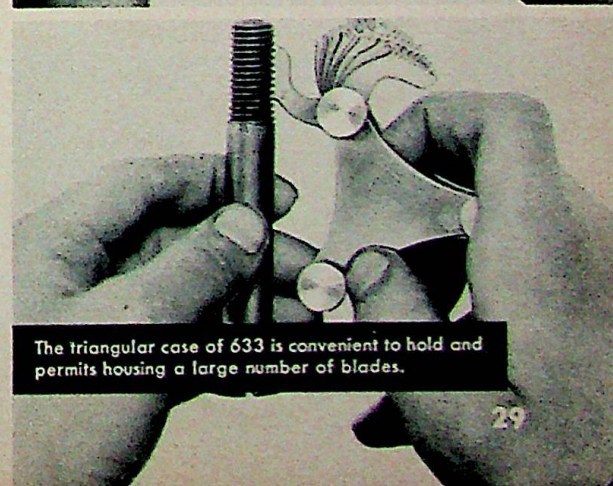
No. 599-635 \$3.50



The double end blades of Brown & Sharpe Fillet and Radius Gages require only half the number of blades for a given range of fillets or radii.



The required blade is securely locked in position by the blade lock on Brown & Sharpe Screw Pitch Gages.



The triangular case of 633 is convenient to hold and permits housing a large number of blades.

BROWN & SHARPE Thickness Gages and Thickness Gage Stock

Brown & Sharpe Thickness Gages are reliable instruments for measuring or checking small distances. Blades are tempered and distinguished by large, easily read figures. Eyelets in ends of cases are a convenience in hanging up tool and some styles have a blade lock for locking blades in position for use.

640 Thickness Gage

22 Blades, $2\frac{3}{16}$ " x $\frac{7}{16}$ ", varying from .004" to .025", inclusive, by .001". Blades are tempered. No. 599-640 \$4.30

642 Thickness Gage

9 Blades, $2\frac{3}{16}$ " x $\frac{7}{16}$ ", .0015", .002", .003", .004", .006", .008", .010", .012" and .015". Blades are tempered. No. 599-642 \$2.75

644 Thickness Gage

9 Blades, 3" x $\frac{1}{2}$ ", .0015", .002", .003", .004", .006", .008", .010", .012" and .015". Blades are tempered. No. 599-644 \$2.75

645 Thickness Gage

9 Blades, 3" long, .0015", .002", .003", .004", .006", .008", .010", .012" and .015". Blades are $\frac{1}{2}$ " wide at heel, $\frac{1}{4}$ " wide at tip and tempered. Blade lock securely positions blade or blades desired. No. 599-645 \$2.75

647 Thickness Gage

Similar to 645. 26 Tapered Blades, 3" long, .0015" to .0025" inclusive by .0005", and .003" to .025" by .001". Blades are tempered. Has blade lock. No. 599-647 \$6.00

648 Thickness Gage

8 Tapered Blades, $4\frac{1}{2}$ " long, .002", .003", .004", .006", .008", .010", .012" and .015". Blades $\frac{1}{2}$ " wide at heel and taper $2\frac{3}{4}$ " to $\frac{1}{4}$ " wide tip. Blades are tempered. No. 599-648 \$4.30

649 Thickness Gage

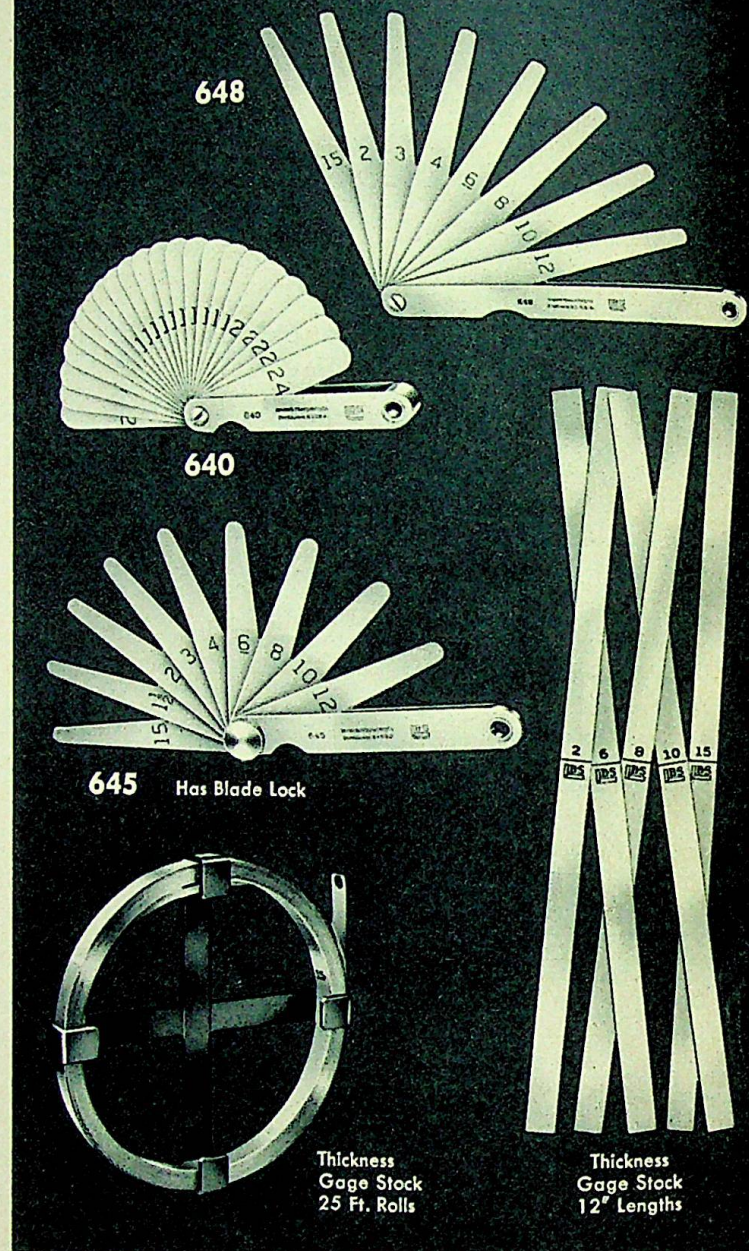
Similar to 648 but has 8 Tapered Blades, 6" long, .002", .003", .004", .006", .008", .010", .012" and .015". Blades $\frac{1}{2}$ " wide at heel and taper $2\frac{3}{4}$ " to $\frac{1}{4}$ " wide tip. Blades are tempered. No. 599-649 \$5.50

Thickness Gage Stock

15 Thicknesses. This accurate, high grade uniformly tempered stock, $\frac{1}{2}$ " wide, is available in thicknesses .0015", and .002" to and including .015" by .001" in 12" lengths. Each piece size marked in large figures and packed in individual envelope bearing length and thickness. For listings and prices, consult factory.

Thickness Gage Stock

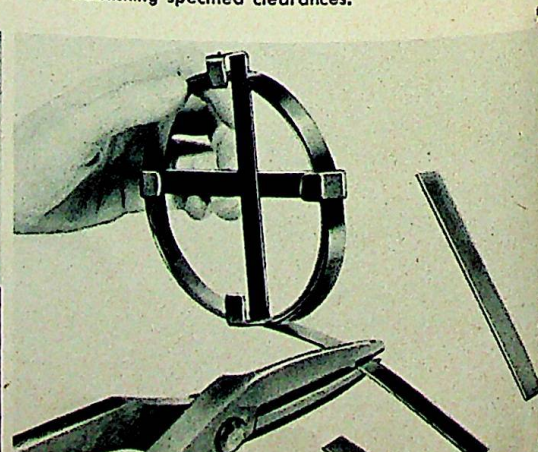
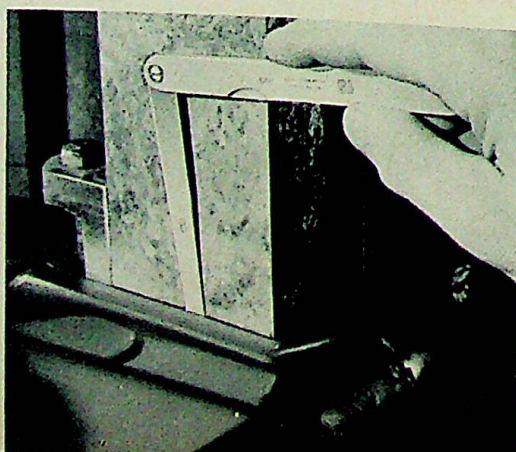
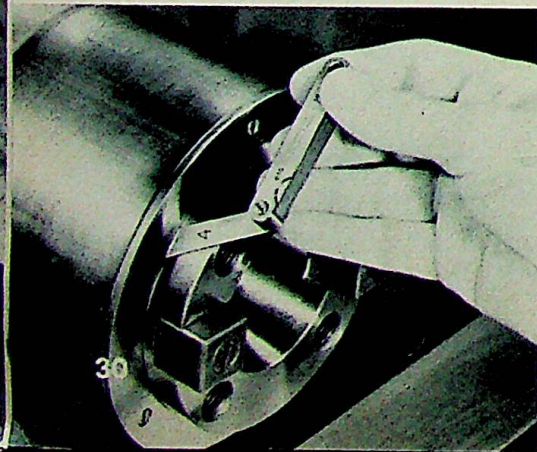
25 ft. rolls, $\frac{1}{2}$ " wide. Size marked at 6" intervals. 10 thicknesses, .0015", .002", .003", .004", .005", .006", .007", .008", .010", and .015". Reel is a desirable feature; permits length desired to be withdrawn easily without binding. For listings and prices consult factory.

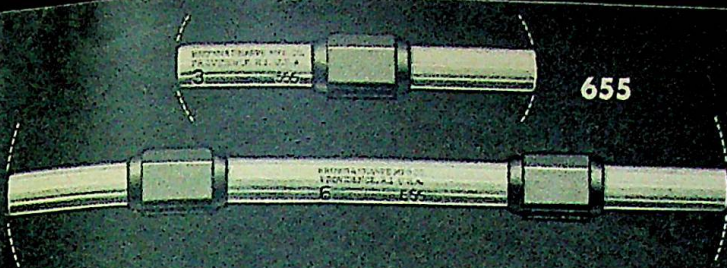


Thickness gages are ideal instruments for determining short measurements—here checking fit of spindle in its housing.

Long blades, as in this case, can be extended for greater distances to determine the fit between large mating surfaces.

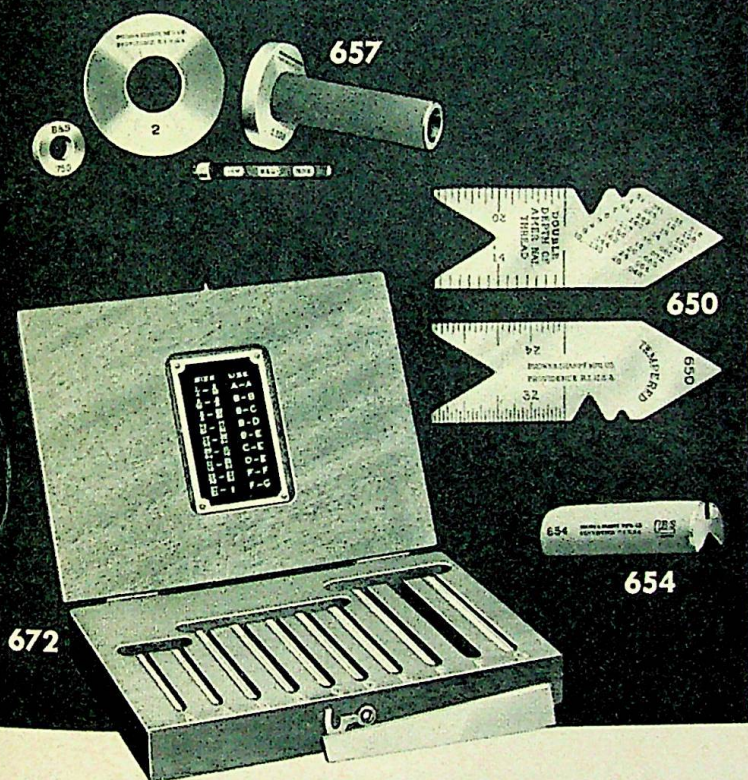
Thickness Gage Stock from the reel permits the use of a specified length and provides precision shims for establishing specified clearances.





BROWN & SHARPE

Center Gage & Center Gage Attachment Standard End Measuring Rods Standard Reference Disks Taper Parallel Gage Set



Center Gages are useful not only in checking thread tools as shown here but, also, in checking cut threads.

The Center Gage Attachment facilitates the lining up of a thread tool with the center gage.

Taper Parallel Gages provide a means of measuring to micrometer accuracy hole sizes in a range from $\frac{1}{4}$ " to 1".

650 Center Gage

Tempered. 60° angles for Unified and American Threads as well as for older Am. Nat'l or U.S. Std. The graduations, 14, 20, 24 and 32 to the inch, are useful in determining number of threads per inch. The table is useful for determining tap drill sizes.

No. 599-650-1 \$1.00

654 Center Gage Attachment

Holds center gage firmly against lathe spindle or face plate in setting cutting tool. Base has V groove and top slot with flat spring for holding center gage. For setting both internal and external tools.

No. 599-654 \$1.00

655 Standard End Measuring Rods

3" to 23" long. High grade steel, hardened on ends, ground accurately to be sections of true spheres. Useful for measuring parallel surfaces, rings and cylinders, setting tools and testing measuring tools. Rubber grips resist effect from heat of hands. One grip on 3" and 4" rods. All larger sizes have two. Rods are $\frac{3}{8}$ " in diameter.

3"	No. 599-655-3	\$3.20	14"	No. 599-655-14	\$ 8.25
4"	No. 599-655-4	3.60	15"	No. 599-655-15	8.50
5"	No. 599-655-5	4.00	16"	No. 599-655-16	9.00
6"	No. 599-655-6	4.50	17"	No. 599-655-17	9.90
7"	No. 599-655-7	5.00	18"	No. 599-655-18	10.75
8"	No. 599-655-8	5.40	19"	No. 599-655-19	11.75
9"	No. 599-655-9	6.00	20"	No. 599-655-20	12.50
10"	No. 599-655-10	6.25	21"	No. 599-655-21	13.25
11"	No. 599-655-11	6.75	22"	No. 599-655-22	14.25
12"	No. 599-655-12	7.00	23"	No. 599-655-23	15.25
13"	No. 599-655-13	7.70			

Intermediate and larger sizes made to order.

657 Standard Reference Disks

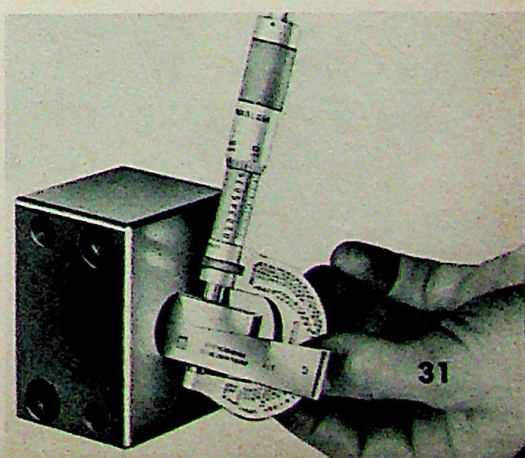
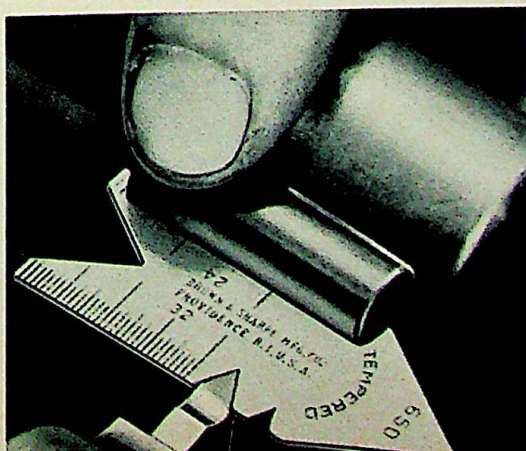
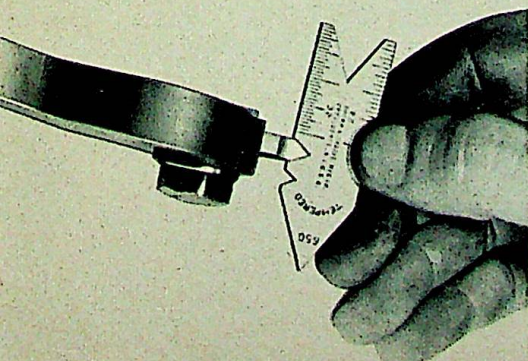
High grade tool steel, hardened, ground and lapped to size to Class XX tolerances. Handles are available for internal testing. For use as reference and not working gages. Sizes from $\frac{1}{4}$ " to 3" inclusive, by increments of 16ths to 1", 8ths from 1" to 2", and 4ths from 2" to 3". $\frac{1}{4}$ " and $\frac{5}{16}$ " sizes have handles. Furnished individually and in a set. For listings and prices consult factory.

672 Taper Parallel Gage Set

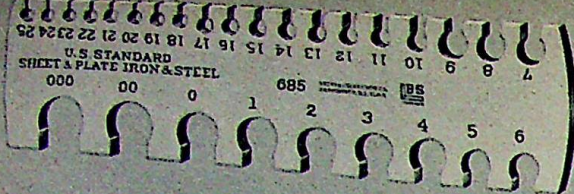
$\frac{1}{4}$ " to 1". For shops lacking full sets of plug gages. To measure a hole size select two correct pieces, expand in hole along tapered surfaces and measure with micrometer. Set consists of 10 gages of high grade tool steel, hardened and ground to very close limits. The small sizes, A and B, are spring tempered to prevent breaking. Measuring surfaces are ground on a radius according to size of member. Furnished in neat wooden case with instructions plainly stamped on plate in cover.

You can size any hole from $\frac{1}{4}$ " to 1" with a micrometer and a Taper Parallel Gage Set—even the odd sizes.

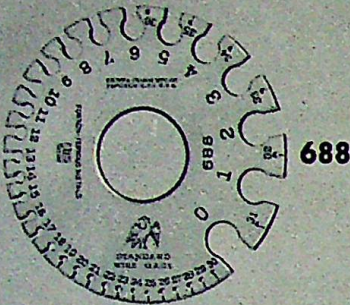
No. 599-672 \$34.00



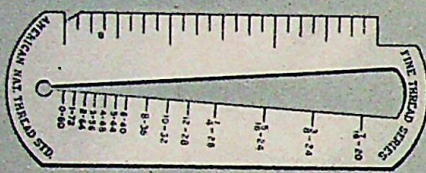
You are SURE of your sizing . . .



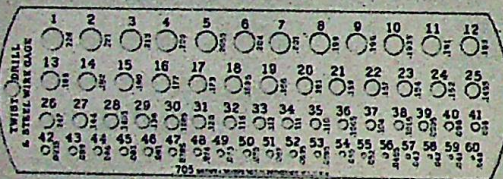
685



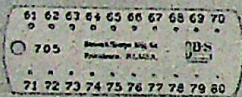
688



701



Large, Hardened, Nos. 1 to 60



Small, Hardened, Nos. 61 to 80

705

684 Rolling Mill Gage (English or Birmingham Standard)

000 to 25. Similar to 685. Adapted to withstand rough usage in rolling mills in gaging iron wire and hot and cold rolled sheet steel. Sizes are English Standard, or Stubs' Iron Wire or Birmingham Gage (designates the Stubs' Soft Wire Sizes). Hardened. For gage sizes, see page 47.

No. 599-684 \$7.75

685 Rolling Mill Gage (U.S. Standard)

Adopted by Congress, March 3, 1893. 000 to 25. Hardened steel about $\frac{1}{8}$ " thick. Adapted to withstand rough usage in rolling mills. Sizes, used for determining duties and taxes levied by United States, are commercial standard in U.S. for uncoated sheet and plate iron and steel. For gage sizes, see page 47.

No. 599-685 \$7.75

688 Brown & Sharpe Wire Gage (American Standard)

The generally accepted standard for non-ferrous metals. Adopted by brass manufacturers, January 1858. 0 to 36. Hardened. Decimal equivalents stamped on reverse side. Screw Slotting Cutters also made to this gage. For gage sizes, see page 47.

No. 599-688-1 \$5.00

690 English Standard Wire Gage

Same as Stubs' Iron Wire or Birmingham Gage. Similar to 688. 0 to 36. Hardened. Decimal equivalents stamped on reverse side. For gage sizes, see page 47.

No. 599-690-1 \$5.00

692 Steel Wire Gage

American Steel and Wire Co.'s (Washburn & Moen) Standard. Similar to 688. 0 to 36. Hardened. For gaging steel wire and drill rod. For gage sizes, see page 47.

No. 599-692 \$5.00

694 U.S. Standard Gage

Adopted by Congress, March 3, 1893, for sheet and plate iron and steel. Similar to 688. 0 to 36. Hardened. Recognized standard in U.S. for uncoated sheet and plate iron and steel. Sizes are used for determining duties and taxes levied by United States. Decimal equivalents on reverse side. For gage sizes, see page 47.

No. 599-694 \$5.00

696 Steel Music Wire Gage

American Steel and Wire Co.'s Standard. Similar to 688. 000000 to 33. Hardened. Decimal equivalents on reverse side. For gage sizes, see page 47.

No. 599-696 \$5.00

700 Pocket Screw and Wire Gage

Similar to 701 but has front graduated for Am. Std. Screws, old style, 0 to 30 and to measure wire or screws from $\frac{1}{16}$ " to $\frac{7}{16}$ ". Back side measures Birmingham, or Stubs' Iron or old English Wire Gage 17 to 0000 and Brown & Sharpe (American) Wire Gage 15 to 0000. For gage sizes, see page 47.

No. 599-700 \$5.00

Below Left—Wire gages simplify the rapid determination of sizes of both sheet stock and wire. Their compact design permits the inclusion of a wide range of sizes in a comparatively small tool.

Below—700 and 701 screw gages quickly check screw sizes—merely place screw in tapered slot, advancing it in V until it touches both sides of slot and then read the size.

with BROWN & SHARPE Gages

701 Unified and American Screw Gage

Front graduated for fine threads and back for coarse threads, Unified and American, as well as for older Am. Nat'l or U.S. Std. Am. National Std. Wood Screws can also be sized on this gage. Edge with angular and 90° slots graduated in 8ths for measuring screws. 4" long, $1\frac{13}{32}$ " wide and $\frac{3}{64}$ " thick.

705 Twist Drill Gage

Also for High Speed Steel drill rod. Hole sizes tested for accuracy after hardening. Large gage, 1 to 60, is $5\frac{1}{4}$ "x $1\frac{5}{8}$ "x $\frac{1}{16}$ "; small, 61 to 80, $2\frac{1}{2}$ "x $\frac{3}{4}$ "x $\frac{1}{16}$ ". Decimal equivalents stamped on front of large gage. For decimal equivalents of twist drill gage, see page 47.

705, 1 to 60

No. 599-701

\$5.00

705, 61 to 80

No. 599-705-2

4.75

707 Twist Drill and Machine Screw Tap Gage

1 to 60. Hole sizes tested for accuracy after hardening. Table gives tap size, pitch, and drill sizes for tap for Unified and American as well as older Amer. Nat'l. or U.S. Std. Threads and hole through which tap will pass. $6\frac{1}{8}$ "x $2\frac{3}{8}$ "x $\frac{1}{16}$ ". For decimal equivalents of twist drill gage, see page 47.

No. 599-707

\$4.75

710 Jobbers' Drill Gage

For twist drills. Hole sizes tested for accuracy after hardening. Decimal equivalents stamped on front side. $6\frac{1}{4}$ "x $2\frac{3}{8}$ "x $\frac{1}{16}$ ".

No. 599-710

\$4.50

715 29° Screw Thread Tool Gage (Acme Standard)

Hardened. Provides a standard for grinding thread tools. Has 29° included angle. Tool setting gage is included.

No. 599-715

\$6.00

716 29° Screw Thread Tool Gage (Acme Standard)

Hardened. Provides a standard for grinding thread tools. Has 29° included angle.

No. 599-716

\$5.00

720 Worm Thread Tool Gage

Hardened. Furnishes correct form for tools for worm threads. Figures give number of threads per inch. A tool setting gage is included.

No. 599-720

\$5.50

724 Unified and American Screw Thread Tool Gage

Hardened. Provides standard for grinding thread tools. For Unified and American threads as well as older Am. Nat'l or U.S. Std. Angles are 60°.

No. 599-724

\$5.75

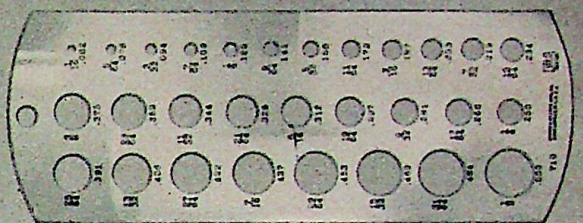
Below—With 707 you know the size of drill to use for both the tap and for the hole through which the tap will pass. These sizes, and size of the tap, are all stamped on the gage.

Below Right—The easiest way to determine the correct form of the cutting tool for an Acme Standard Thread is with a tool gage of this kind. Its use insures accurately finished threads.

Twist Drill & Machine Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap		Screw Tap	
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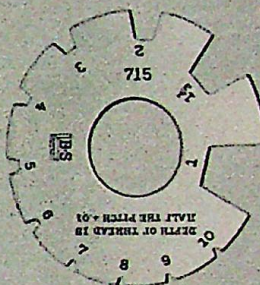
Hardened, Nos. 1 to 60

707

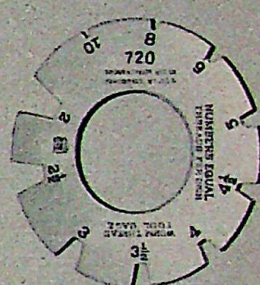


Hardened, Range $\frac{1}{16}$ " to $\frac{1}{2}$ " by 64ths

710



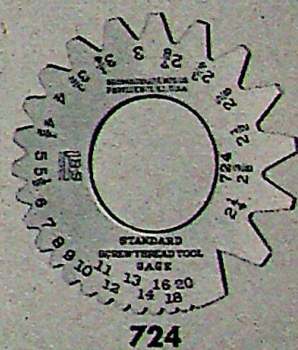
715



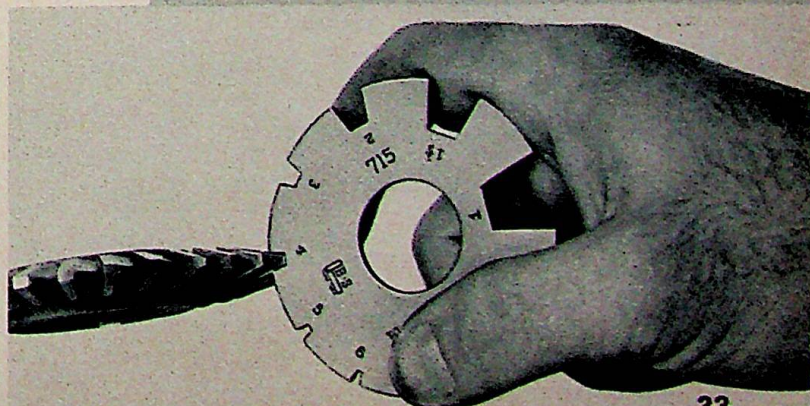
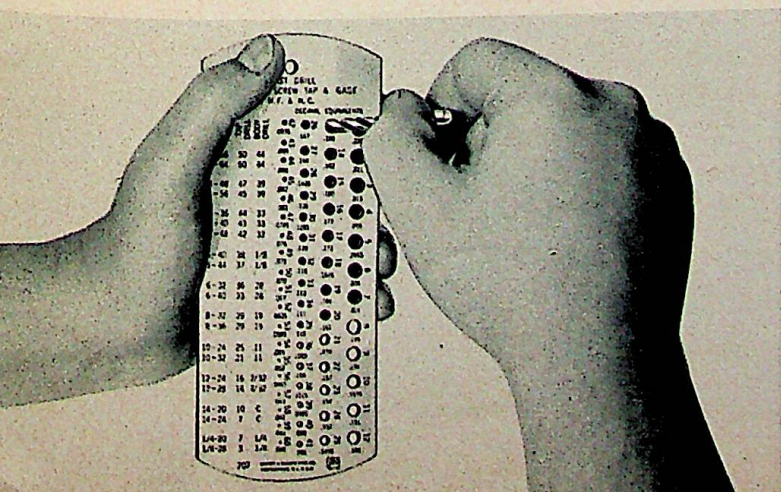
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716

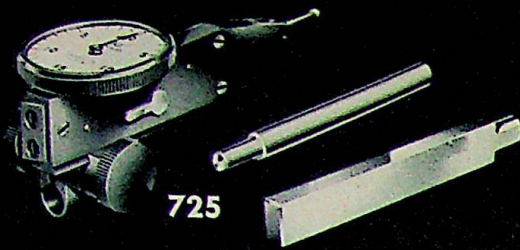


724



BROWN & SHARPE

Dial Attachments Dial Gages Hole Attachments Dial Test Indicators



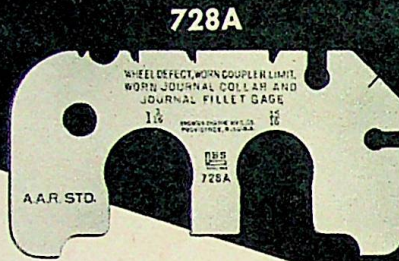
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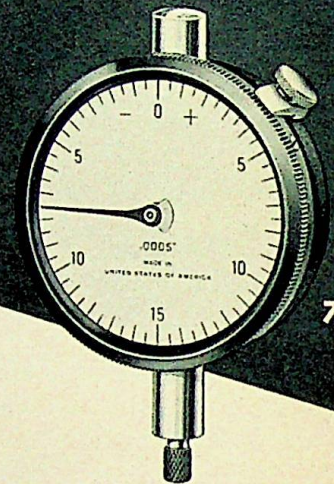
729A



729B



728A



726

725 Dial Attachment

For use with 585, 621 and 622. Range, .030" by .001". Low friction, jeweled bearings. Unit is 2 3/4" long over-all. Dial, 1 1/8" diameter, can be turned to bring zero to any desired position. Contact point can be set at practically any angle and direction of movement reversed. Swivel is adjustable along dovetail on bottom and end of case. Rod is for use with 621 and 622; bar for 585. Attachment furnished in wooden case. Extra bar or rod can be furnished.

For 585 (10"), 621 and 622	No. 599-725-1	\$27.00
For 585 (18" and 24"), 621 and 622	No. 599-725-2	27.00

725A Dial Attachment

For use with 585. Range, .008" by .0001". Jeweled bearings. Similar to 725, but reading to .0001", except that rod for use with surface gages is not furnished as this tool requires more rigid support. Extra bar can be furnished.

For 585 (10")	No. 599-725-3	\$37.50
For 585 (18" and 24")	No. 599-725-4	37.50

726 Dial Gage

For dial test indicators. Spindle movement, .075" by .0005". Can be attached to any of our indicators except 740 and 743. Movement is an individual unit, with precision parts made of stainless steel. White enamel dial face and bezel can be turned to bring zero under hand, and clamped. Lug on back of gage has 1/4" hole. Removable point of gage permits using points of different forms and lengths. Dial is 2 1/2" diameter; stem, .375" diameter. Can be furnished to order with .500" spindle movement.

No. 599-726-2	\$10.00
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726A Dial Gage

For dial test indicators. Spindle movement, .025" by .0001". Jeweled bearings for use where inspection and testing are held to close limits. Similar to 726 except for spindle movement and graduations. Recommended for use with 730, 731, 731A, 733, 744 and 744A.

No. 599-726-1	\$30.00
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728A Wheel Defect, Worn Coupler Limit, Worn Journal Collar and Journal Fillet Gage

A.A.R. Standard. Determines extent of defects and wear. Hardened steel, dull chromium plated. Measuring surfaces ground and finished accurately.

No. 599-728	\$5.00
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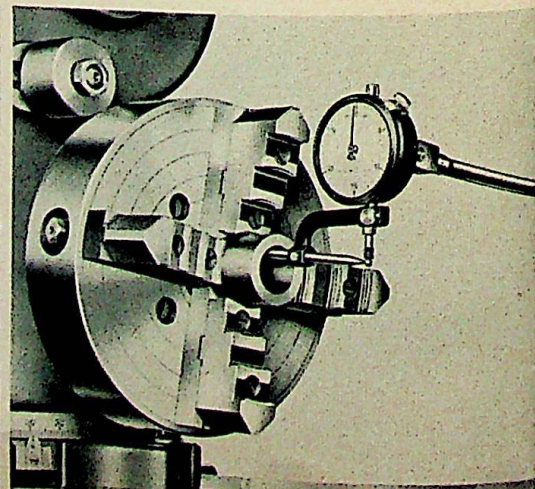
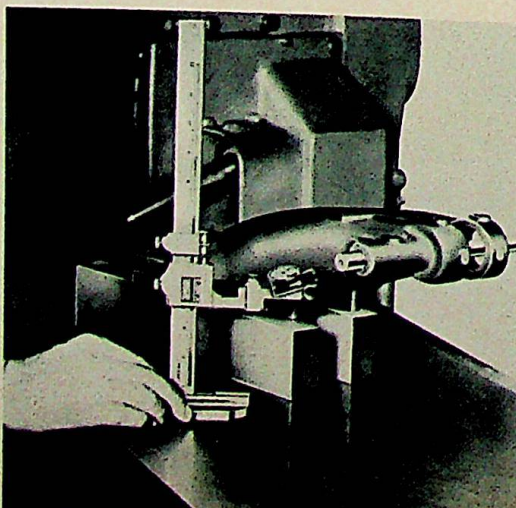
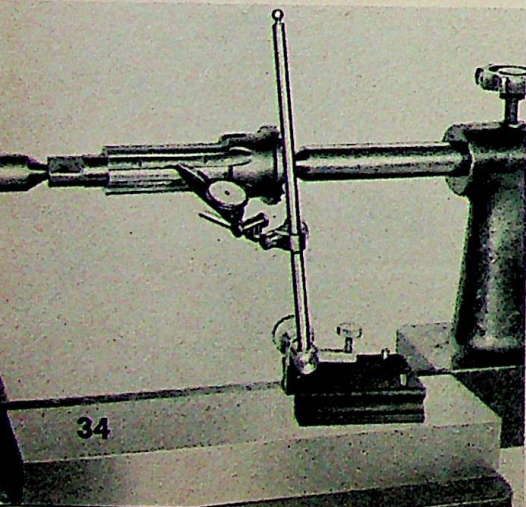
729A, 729B, 729C and 729D Hole Attachments

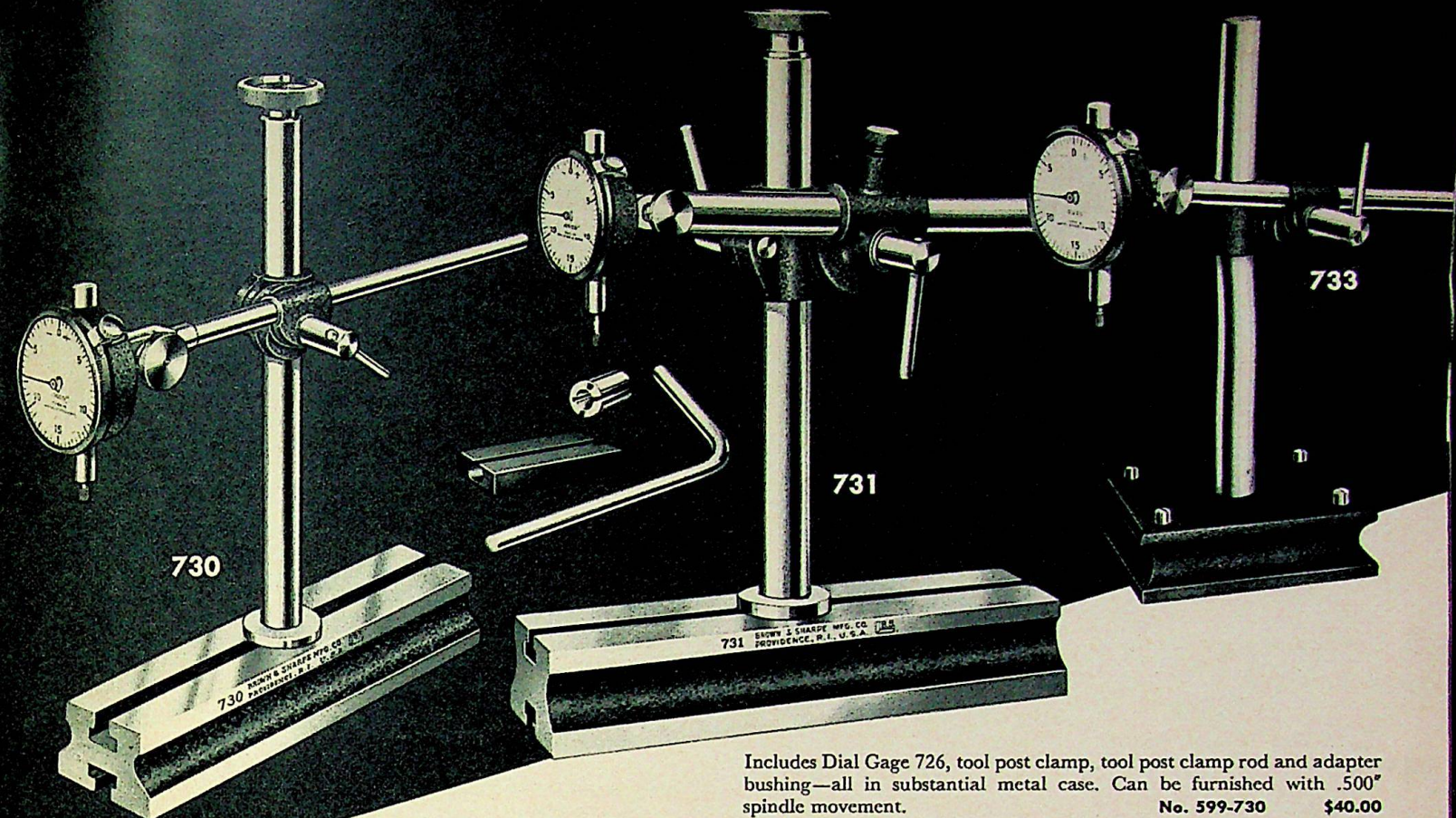
For use with dial test indicators. Adapt indicators for testing internal surfaces which cannot be reached with spindles of dial gages. Attached

725 used with Surface Gage 621 makes many tests easy. The small point will enter small recesses, slots and splines.

For precision testing, 725A, reading in ten-thousandths, is used conveniently with a 10" Vernier Height Gage. Relative measurements are accurately determined.

Hole Attachment 729, in two sizes, permits accurate internal tests with a Dial Test Indicator. Available for two stem sizes .275" and .375".





easily and firmly clamped. Adjustable fulcrum screw permits eliminating any looseness or play in the hardened, $\frac{1}{32}$ " diameter finger. 729A and 729C are for use in holes to $1\frac{1}{16}$ " depth. 729B and 729D are similar, for use in holes to $1\frac{3}{16}$ " depth, or rough grinding operations.

For use with dial gages having .275" dia. stems	729A	No. 599-729-1	\$3.25
	729B	No. 599-729-2	3.25
For use with dial gages having .375" dia. stems	729C	No. 599-729-3	\$3.25
	729D	No. 599-729-4	3.25

730 Dial Test Indicator

Spindle movement, .075" by .0005". Tubular upright and lever style clamp on swivel. Dial holding rod, .375" dia., $9\frac{3}{32}$ " long to center of stud; upright, .738" dia., $8\frac{3}{4}$ " long; dial, $2\frac{1}{32}$ " dia.; stem, .375" dia.; base, $8\frac{1}{2}$ " long, $2\frac{1}{4}$ " wide. Very rigid tubular upright is clamped to base by knurled nut at top. Horizontal arm adjustable at any angle, can be removed and used independently. Lever style clamp for quick, positive adjustments.

Dial Test Indicator 730 is used to check the accuracy of the alignment of a machine assembly together with a Vernier Height Gage.

The heavy 731 Indicator is suited for high precision work. Individual clamps permit one setting to be changed without disturbing the others.

Includes Dial Gage 726, tool post clamp, tool post clamp rod and adapter bushing—all in substantial metal case. Can be furnished with .500" spindle movement.

No. 599-730 \$40.00

731 Dial Test Indicator

Spindle movement, .075" by .0005". Super-rigid tubular construction. Dial holding rod, .738" dia., $9\frac{3}{4}$ " long to center of stud; upright, .987" dia., 10" long; dial, $2\frac{1}{32}$ " dia.; stem, .375" dia.; base, 10" long, 3" wide. Separate clamps permit each adjustment to be made without disturbing other settings. Includes dial gage 726 and substantial metal case. Can be furnished with .500" spindle movement.

No. 599-731 \$60.00

731A Dial Test Indicator

Spindle movement, .025" by .0001". Similar to 731 except dial gage 726A is furnished. For work where extreme accuracy is required.

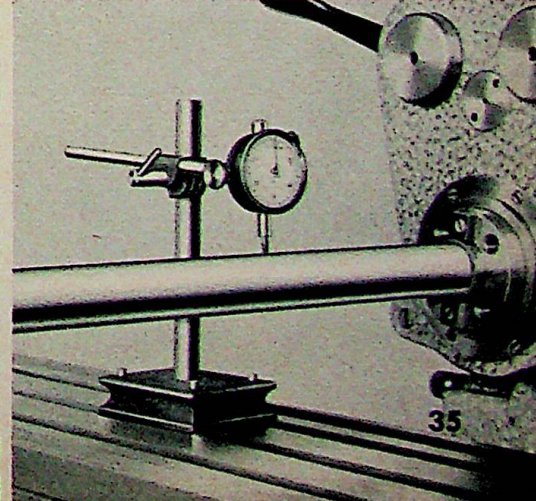
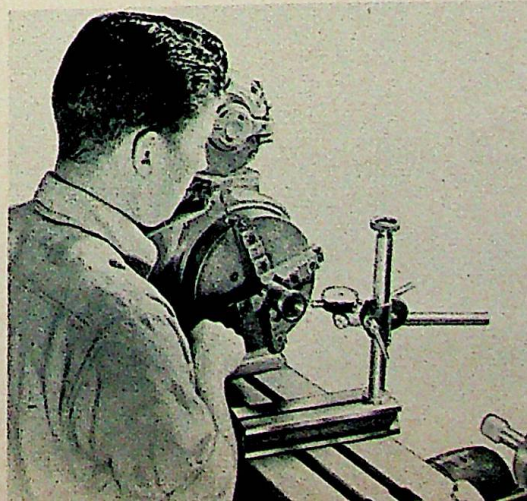
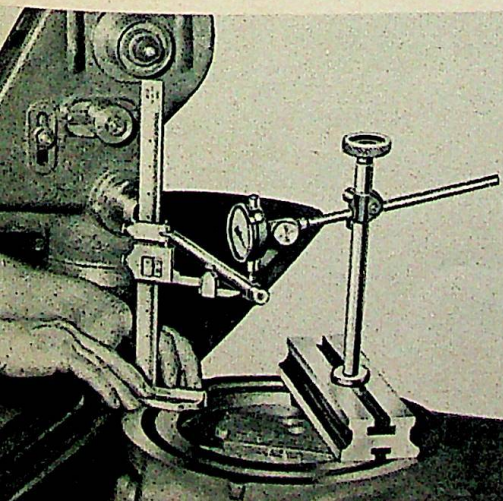
No. 599-731-2 \$80.00

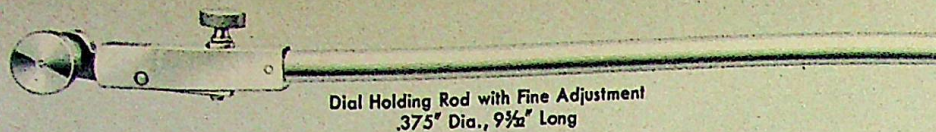
733 Dial Test Indicator

Spindle movement, .075" by .0005". Dial holding rod, .375" dia., $9\frac{3}{32}$ " long to center of stud; upright, .738" dia., 8" long; dial, $2\frac{1}{32}$ " dia.; stem, .375" dia.; base, $4\frac{1}{4}$ " long, $3\frac{1}{4}$ " wide, $1\frac{1}{8}$ " thick. The large diameter solid upright makes the indicator extremely rigid. Base has a gage pin at each corner which when pushed down can be used against straight edge, etc. Well suited for use in motor service shops. Includes dial gage 726 and substantial metal case. Can be furnished with .500" spindle movement.

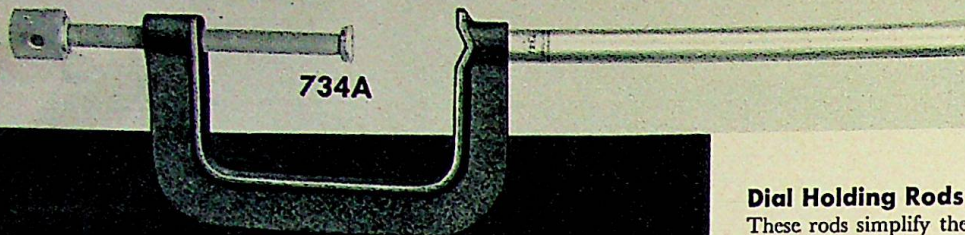
No. 599-733 \$33.00

Small, compact base of 733 is manipulated easily and the gage pins line up the indicator from the edge of a surface plate or T slot.

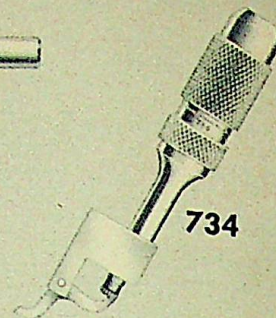




Dial Holding Rod with Fine Adjustment
.375" Dia., 9 $\frac{3}{4}$ " Long



734A



734

Dial Holding Rods with Fine Adjustment

These rods simplify the close setting of Dial Test Indicator. With Dial Gage in approximate position, merely turn fine adjustment screw until gage point contacts work and pointer swings to desired position on dial.

.375" dia., 9 $\frac{3}{4}$ " long. For 730, 733, 744 and 744A Indicators.

No. 599-730-10 \$7.50

.738" dia., 10 $\frac{1}{2}$ " long. For 731 and 731A Indicators.

No. 599-731-10 \$12.50

Separate Parts for Dial Test Indicators

Dial Holding Rods, Uprights, Permanent Magnet Base and Upright, Sliding Swivels, Contact Points and other parts for Dial Test Indicators can be furnished individually.

734 Universal Attachment

See also 734B. Used with Dial Gages having .275" dia. stems. Tests internal and other surfaces inaccessible to regular straight spindle. Dial gage point actuates bell crank point through an intermediary rod.

No. 599-734 \$6.25

734A Clamp Attachment

For Dial Test Indicators having swivels for uprights and dial holding rods .375" in dia. Used also with Adapter Bushing with indicators having .738" dia. uprights. Capacity, $\frac{9}{16}$ " to 2 $\frac{3}{4}$ " dia. Rod .375" dia., 5 $\frac{9}{16}$ " long. Clamps securely to spindle, arbor or other machine member to hold dial gage for convenient use. Brass shoe on bolt prevents marring finished surface.

No. 599-734-1 \$4.10

734B Universal Attachment

Similar to 734 but for use on indicator stems .375" in dia.

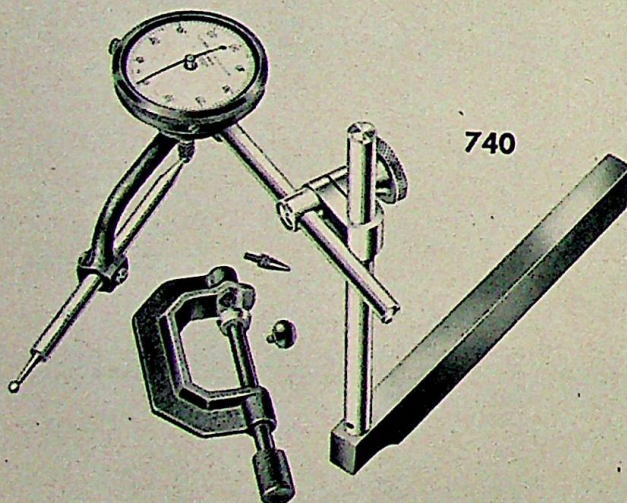
No. 599-734-2 \$6.25

740 Universal Dial Indicator Set

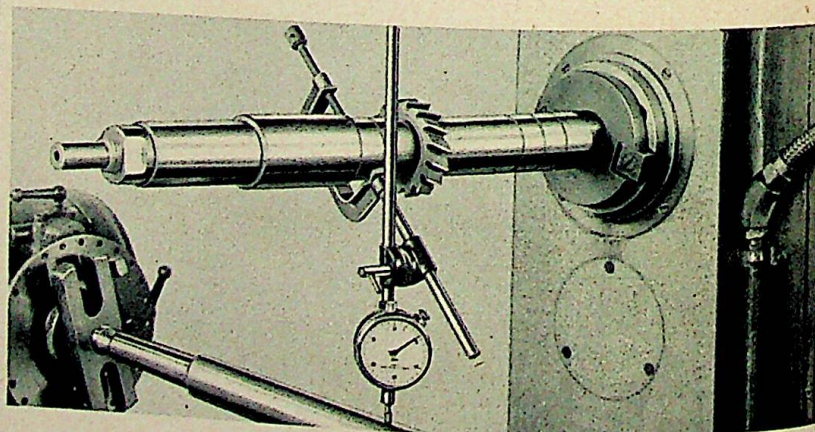
Spindle Movement .100" by .001". Dial is 1 $\frac{1}{16}$ " dia. Stem .375" dia. Dial Holding Rod .250" dia., 3 $\frac{3}{16}$ " long. Upright .312" dia., 5" long. Case hardened steel base is 5 $\frac{15}{16}$ " long, $\frac{3}{8}$ " thick and $\frac{7}{8}$ " wide. Swivel also fits Surface Gages 621. Adjustable to almost any position and used in places inaccessible to conventional indicators. Hole attachment will enter holes to a depth of 1 $\frac{1}{16}$ ". By setting point against work with enough pressure to give hand one-half revolution, readings may be taken .050" either side of zero.

No. 599-740 \$20.00

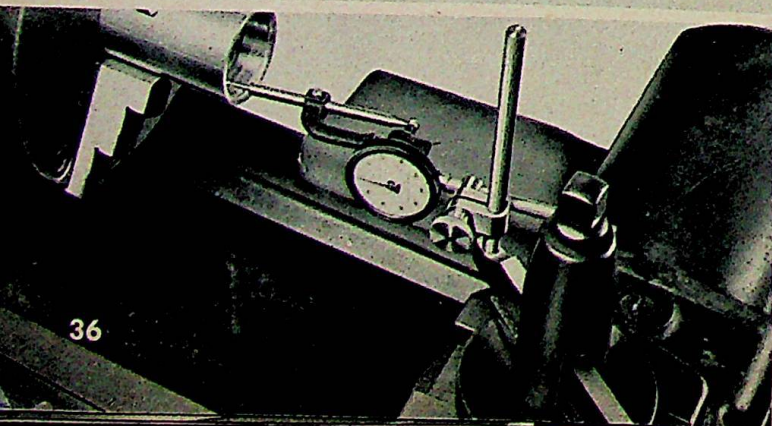
Individual parts of this set and a finished wooden case can be furnished.



740

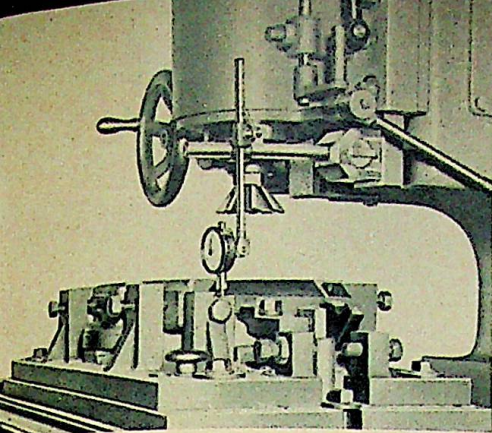


A 734A Attachment, clamped to arbor, is securely holding dial gage for testing work between centers.

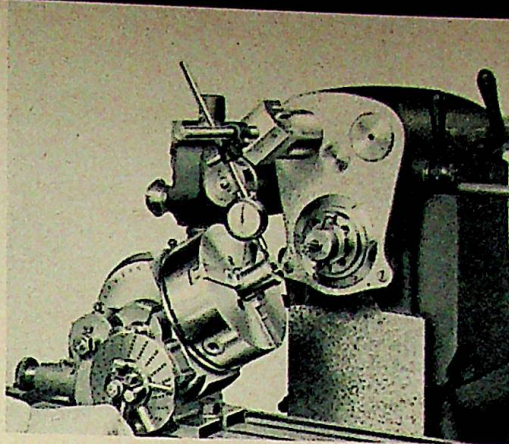


At Left—740 held in lathe tool post is used as a means of centralizing bushing held in chuck.

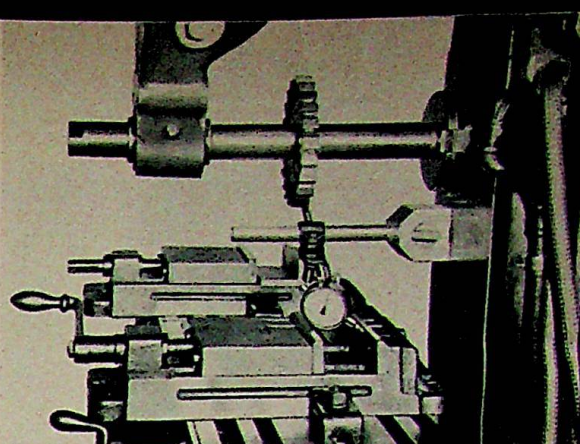
BROWN & SHARPE Dial Test Indicator Attachments and Universal Dial Indicator Set



744 used in horizontal position on vertical milling machine to check setup of fixture on table.



Used on overarm of milling machine, 744 easily checks concentricity of work held in dividing head.



744 on vertical column of milling machine lines up vise on machine table for precise milling operation.

Use **BROWN & SHARPE** Dial Test Indicators with Permanent Magnet Bases in any position—Vertical, Horizontal, or Upside-Down!

743 Dial Test Indicator with Fine Adjustment and Permanent Magnet Base

Base, $2\frac{1}{16}'' \times 3\frac{1}{8}'' \times 1\frac{5}{16}''$. Dial Holding Rod $2\frac{5}{8}''$ long, $\frac{1}{32}''$ dia. Post $9\frac{3}{8}''$ long, $\frac{5}{16}''$ dia. Range of Dial Attachment .030" by .001". Fine adjustment simplifies bringing indicator point to exact setting. Permanent magnet base, turned on or off in an instant, holds indicator firmly to any iron or steel surface in upright, horizontal or even upside-down position.

Can be furnished, also, without Dial Attachment.

No. 599-743 \$57.50

744 Dial Test Indicator with Permanent Magnet Base

Spindle Movement .075" by .0005". Dial $2\frac{1}{32}''$ dia. Stem .375" dia. Base $2\frac{3}{4}''$ long, $2\frac{1}{16}''$ wide, $2\frac{1}{16}''$ thick. Dial Holding Rod .375" dia., $9\frac{3}{32}''$ long. Upright .738" dia., $7\frac{1}{16}''$ long. Base has only one moving part—the magnet. A turn of control to ON holds indicator to any iron or steel surface in upside-down or any other position. A turn to OFF and indicator is released. Solid upright makes indicator very rigid. For Dial Gage, see 726, page 34. Furnished in substantial metal case.

No. 599-744 \$50.50

Can be furnished with $\frac{1}{8}''$ spindle movement.

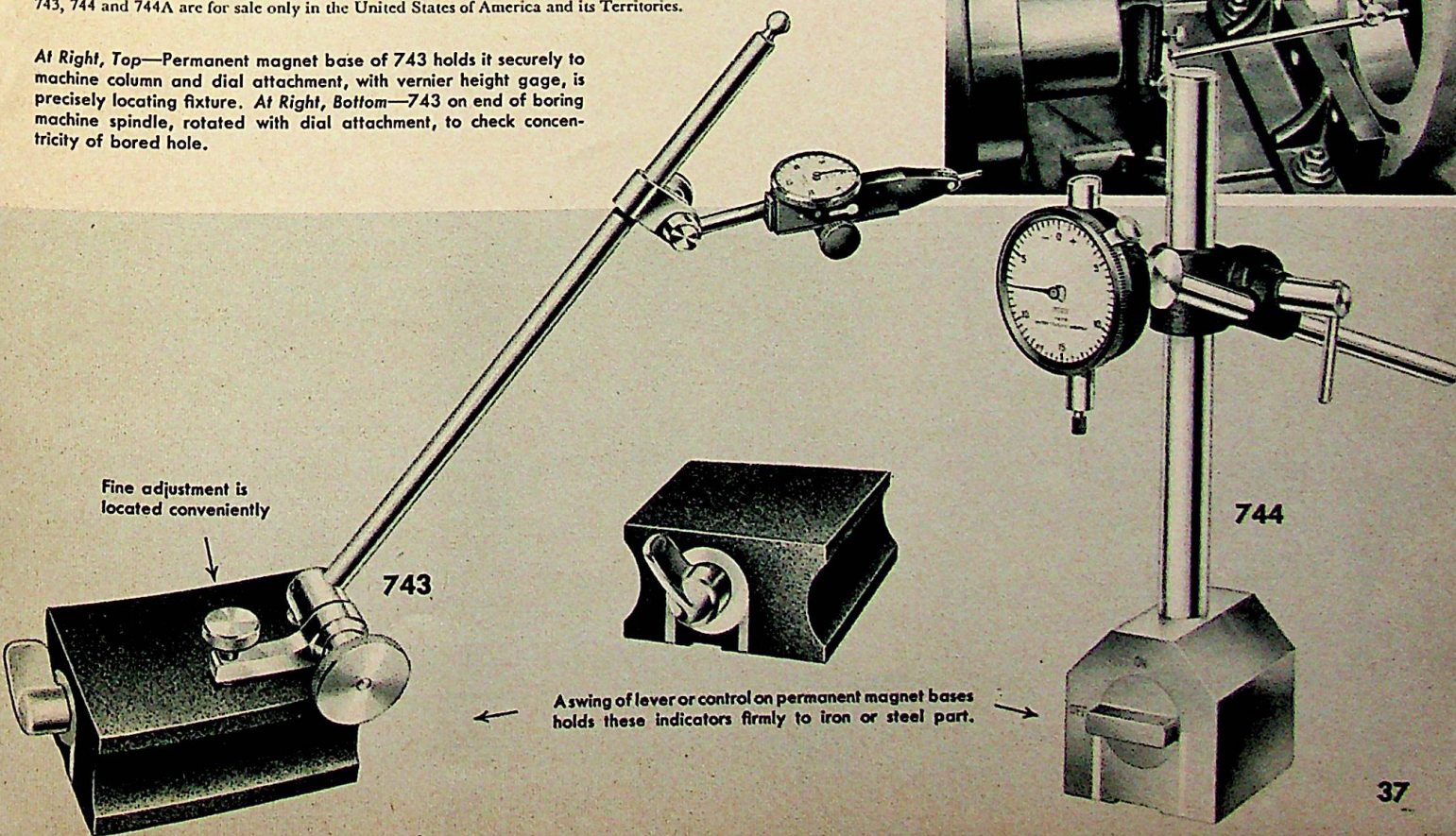
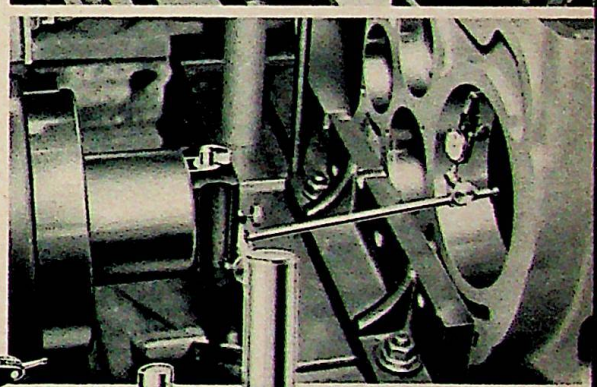
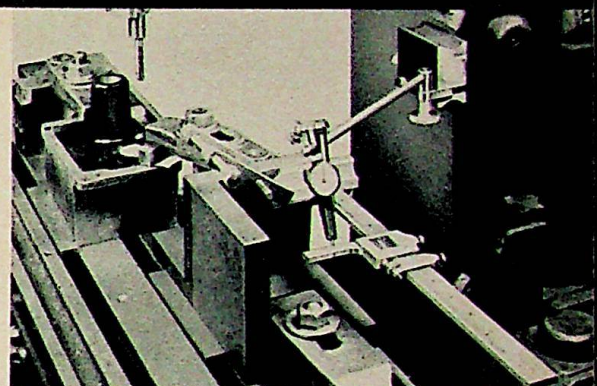
744A Dial Test Indicator with Permanent Magnet Base

Similar to 744 but has Dial Gage with jeweled bearings with spindle movement of .025" by .0001". For Dial Gage see 726A, page 34. Furnished in substantial metal case.

No. 599-744-2 \$70.50

743, 744 and 744A are for sale only in the United States of America and its Territories.

At Right, Top—Permanent magnet base of 743 holds it securely to machine column and dial attachment, with vernier height gage, is precisely locating fixture. At Right, Bottom—743 on end of boring machine spindle, rotated with dial attachment, to check concentricity of bored hole.



Fine adjustment is located conveniently

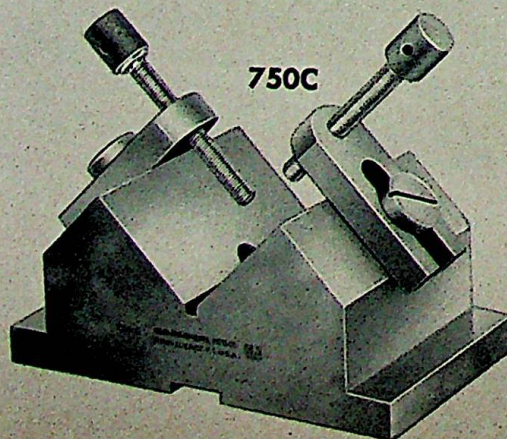
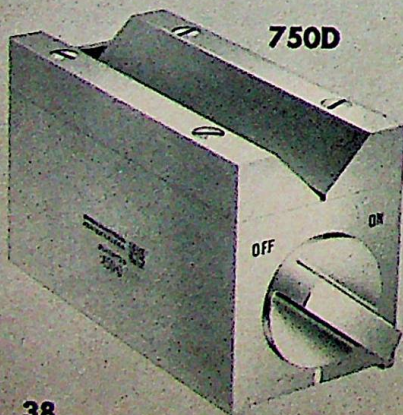
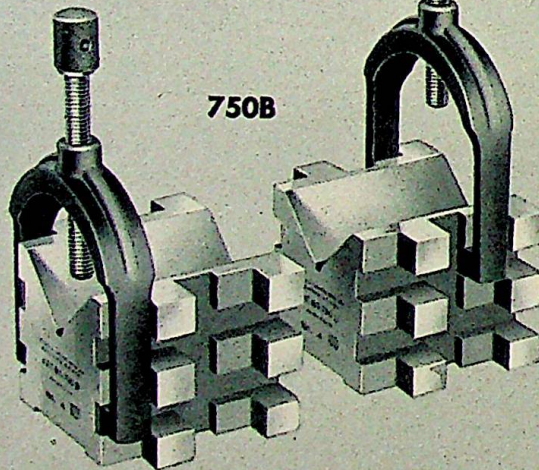
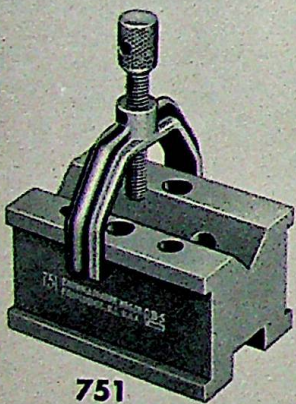
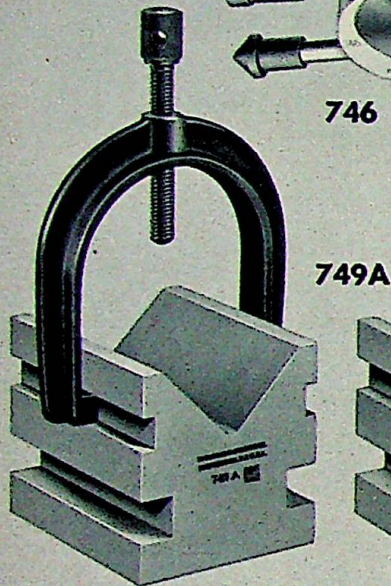
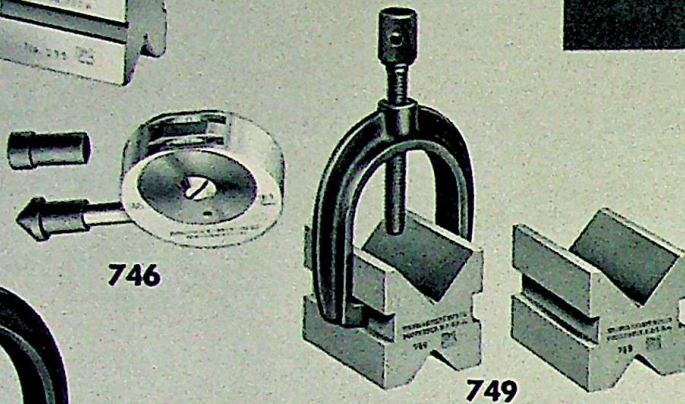
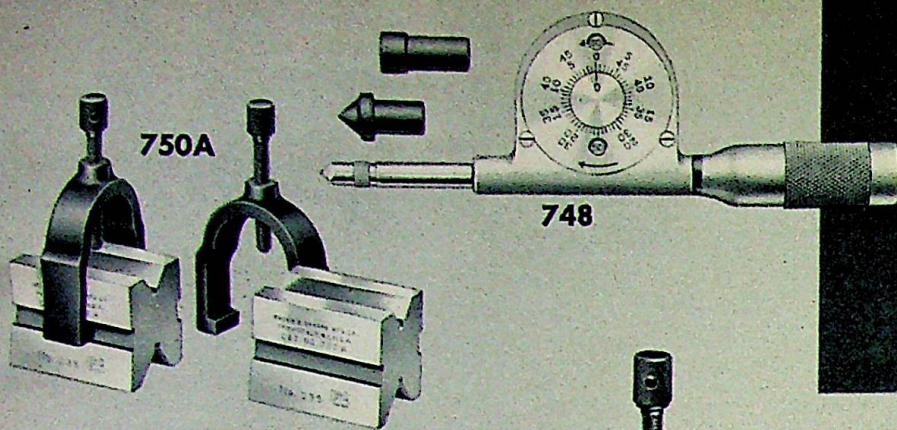
743

744

Aswing of lever or control on permanent magnet bases holds these indicators firmly to iron or steel part.

BROWN & SHARPE

Speed Indicators and V Blocks



746 Vest Pocket Speed Indicator

Useful for checking speed of rotating shafts, etc. After setting at zero, place thumb directly on the small depression on the side of the tool, and apply the rubber point to the center of the rotating shaft whose R.P.M. is to be determined. Every hundred revolutions the steel plate lifts beneath thumb. Counting the number of lifts in one minute (each representing 100) and adding the reading in units of 5 which appears in the slot at the top of the tool, gives the R.P.M. Includes 2 rubber points. Extra points can be furnished.

No. 599-746 \$6.40

748 Speed Indicator

Dull nicked. Accurately determines speed of shafting, etc., running in either direction. Registers up to 5,000 revolutions. Figures showing through the small round windows on the dial read every 5 revolutions. The inside dial reading every 100 revolutions is quickly returned to zero by a knurled knob on the back. Handle is insulated against electricity and is hollow to hold the two rubber points when not in use. Extra points can be furnished.

No. 599-748 \$12.00
Case No. 599-748-9999 2.50

749 V Blocks and Clamp

Blocks and one clamp hold round stock to be drilled, milled or ground. Made of cast iron. Each block is 2" long by 1 1/2" square and takes work to 1 1/2" diameter. Extra clamps can be furnished.

No. 599-749 \$3.50

749A V Blocks and Clamp

Two blocks and one clamp, for larger and heavier work. Made of cast iron. Each block is 3" long by 2 1/2" square and takes work from 1/2" to 2 1/2" diameter. Lower grooves permit blocks to be clamped to table. Extra clamps can be furnished.

No. 599-749-1 \$10.00

750A V Blocks and Clamps

Suited for the finest tool room work. Made in numbered pairs, of hardened steel, and accurately finished all over. Each block is 1 3/4" long by 1 1/4" square and takes work to 1" diameter.

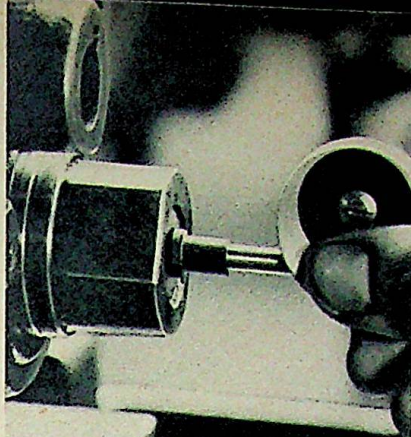
No. 599-750-1 \$12.50

750B V Blocks and Clamps

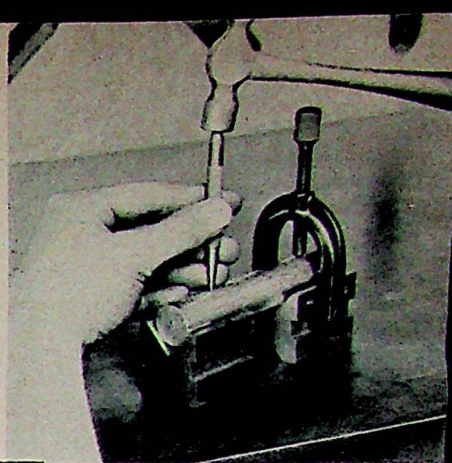
Stepped construction allows changing work quickly from small work to work 2" diameter. As clamps do not project, the blocks can be used on their sides. Blocks are hardened steel, accurately ground all over. Made in numbered pairs. Each block is 2 1/2" long, 2 3/4" wide, by 2" high. Clamps are drop forged. A single block and clamp can be furnished.

No. 599-750-2 \$21.00

746 is a small but mighty indicator. As its spindle turns, the steel plate lifts under the thumb each 100 revolutions. It is as simple as that to determine R.P.M.



749 V Blocks and Clamp provide a handy means for holding round stock for light machine operations and bench work.



Whatever the V Block Need . . . **BROWN & SHARPE** Has a Style for it

750C V Block

Leaves entire top side of the work accessible. Two clamps hold work of round, square or rectangular cross section. A $\frac{1}{2}$ " hole through the center of the block allows drills, etc., to project through the work. Has groove in bottom $\frac{5}{8}$ " wide and $\frac{1}{8}$ " deep for use as tongue slot on a machine table. Block is hardened steel, 3" long, $4\frac{3}{4}$ " wide, $2\frac{1}{4}$ " high, ground on bottom. Holds round stock to $1\frac{1}{2}$ " diameter. Clamps and screws are hardened.

No. 599-750-3 \$19.50

750D Permanent Magnet V Block

For holding iron or steel work of any cross section which can be placed between and in contact with the V faces. Suited for toolmaking, inspection and both wet and dry grinding. When turned "ON", the permanent magnet holds the work firmly in the V and if the block rests on a magnetically conductive surface, it is held firmly to this surface. Turning control to "OFF" releases both. Used similarly when block is placed on end. Holding power can be regulated. V block does not heat and can be left "ON" as long as desired. Block is accurately ground and faces of V groove are hardened. Removable stop plate furnished for back end of block. V takes round stock to $1\frac{3}{4}$ " diameter. Block is $6\frac{1}{4}$ " long overall including stop plate and control, $2\frac{1}{16}$ " wide and $3\frac{1}{4}$ " high. Furnished in finished wooden case. Matched sets of blocks can be furnished.

No. 599-750-4 \$49.50

For sale only in the United States of America and its Territories.

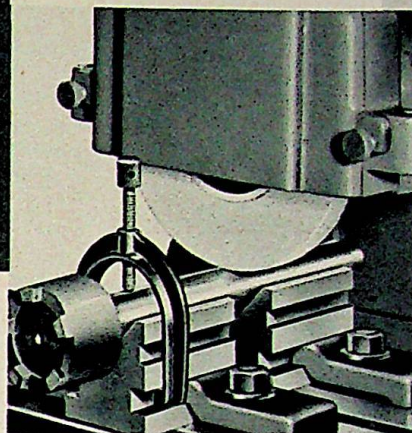
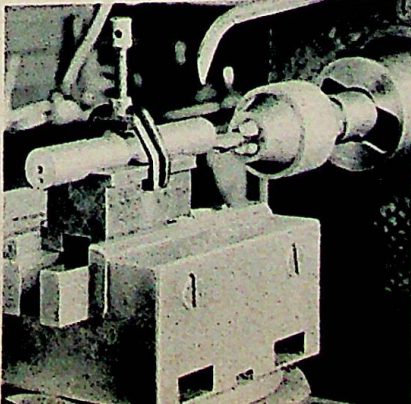
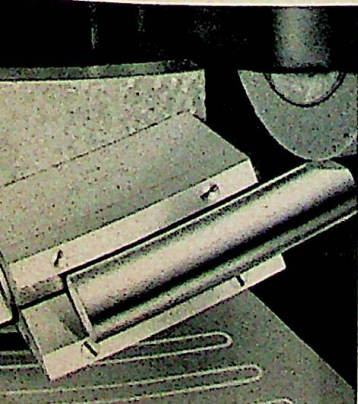
751 Handy Block and Clamp

For general use for holding small circular or flat pieces for milling, grinding or drilling. Used as a vise, anvil, V block or centering clamp. Block is case hardened, 3" long, $1\frac{3}{4}$ " high, and 2" wide. Will hold round stock up to 1" diameter and flat stock up to $\frac{3}{4}$ " by $1\frac{1}{4}$ ". Block or clamp can be furnished separately.

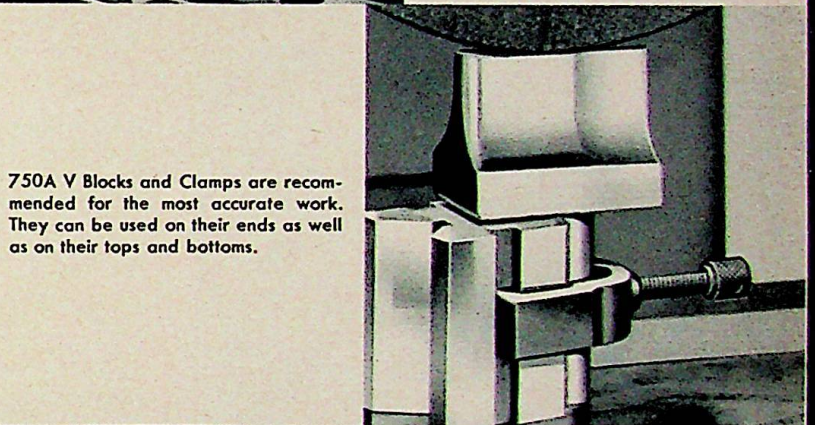
No. 599-751 \$9.00

750D is positioned easily and held magnetically on knee, holding round stock firmly for grinding.

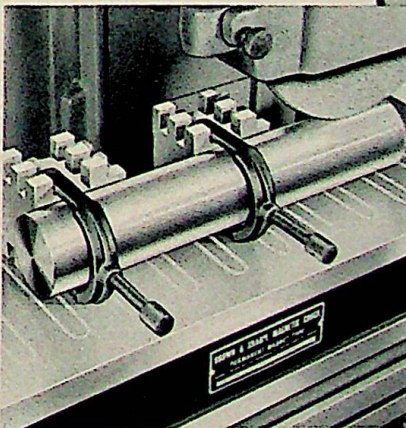
751 is equipped with V, flat grooves and holes for drilling and other odd jobs around the garage or home.



For large, heavy work, 749A Blocks and Clamp are very suitable. The double grooves in the sides permit quick adjustment from small to large work.

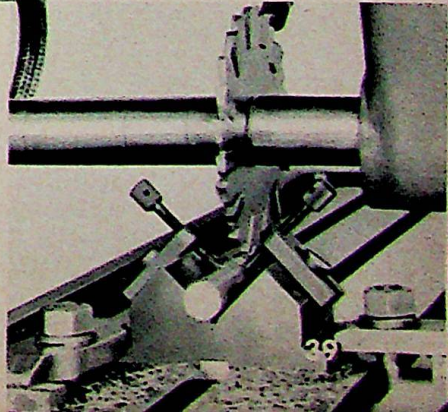


750A V Blocks and Clamps are recommended for the most accurate work. They can be used on their ends as well as on their tops and bottoms.



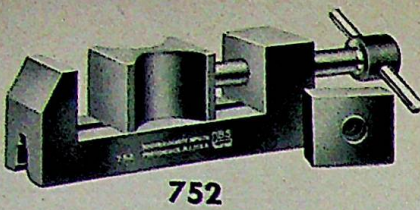
The stepped construction of 750B V Blocks permits adjustments from small to large sizes instantly. Blocks also can be used on their sides. For the finest precision work.

Where round work held in a V block must be exposed for top operation, 750C V Block is the answer. With this block, work is clamped securely from each side.

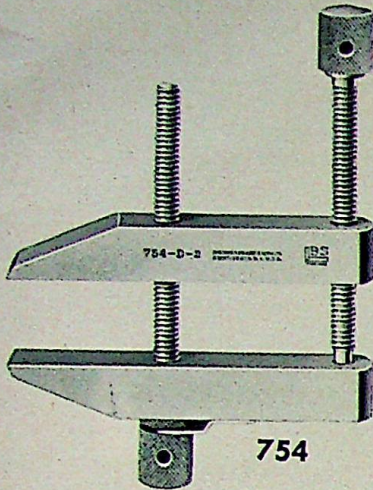


BROWN & SHARPE

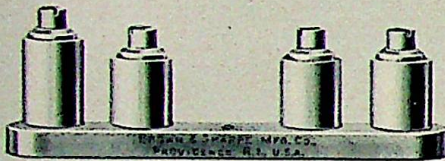
TOOLMAKERS' TOOLS . . .



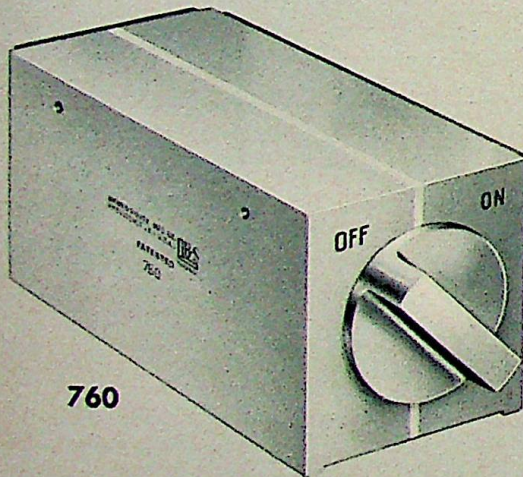
752



754

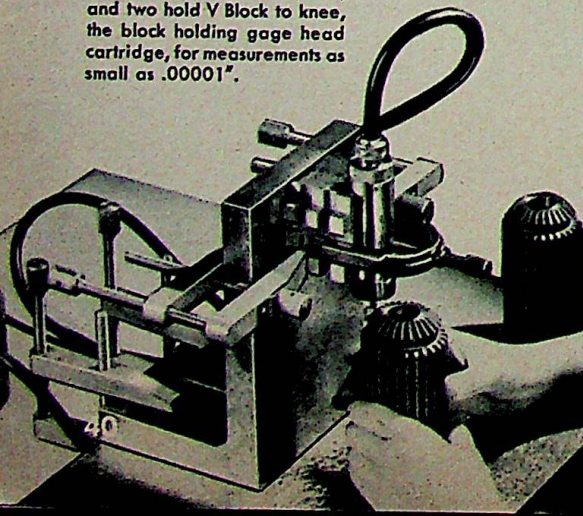


758



760

Here two Toolmakers' Clamps hold a knee to a surface plate, and two hold V Block to knee, the block holding gage head cartridge, for measurements as small as .00001".



752 Toolmakers' Vise

Handy for use in drilling, fitting and laying out work on surface plates. Case hardened. V groove in ground base takes work from $\frac{9}{32}$ " to $\frac{11}{16}$ " diameter. Tongue on large jaw slides in groove in base and is held in place by a strap that prevents jaw from lifting. $1\frac{1}{16}$ " capacity. Furnished with two steel jaws as shown. No. 599-752 \$6.50

754 Toolmakers' Clamps

Steel, case hardened. Ends of jaws chamfered to facilitate clamping under shoulder or in recess. Clip holds loose jaw in position when clamp screw is released, a convenient and original Brown & Sharpe feature.

Jaws Open, Inches	Length Jaws, Inches	Number	Price
754	$\frac{5}{8}$	599-754-5	\$1.50
	1	599-754-8	1.65
	$1\frac{1}{2}$	599-754-12	1.75
	2	599-754-16	2.25
	$2\frac{1}{2}$	599-754-20	2.50
	$3\frac{1}{2}$	599-754-28	4.50

758 Toolmakers' Buttons

Precisely locate holes with positive accuracy. Ends ground square with sides. The long button, a Brown & Sharpe exclusive, permits buttons to be used close together. Made in sets of four of the same diameter—three $\frac{1}{16}$ " long, one $\frac{9}{16}$ " long. Steel base holder protects ends of screws.

758	$\frac{3}{16}$ " dia.	No. 599-758-3	\$7.00
	$\frac{4}{16}$ " dia.	No. 599-758-4	7.00
	$\frac{5}{16}$ " dia.	No. 599-758-5	7.00

Tap No. 5-40 N.C. for use with buttons

No. 783-101-1 \$.50

760 Permanent Magnet Block

Holds firmly iron or steel work. Suited for toolmaking, inspecting or manufacturing and for wet or dry grinding. When turned "ON" work is held firmly on block, and block, also, is held on any magnetically conductive surface. When turned to "OFF" both block and work are released. Holding power can be regulated in strength by partial turning of control. Magnetic pull on end of block permits use in upright position. Work can be left on block as long as desired as it does not heat under any conditions. Block is made substantially; retains its holding power indefinitely. Working surface and base are ground parallel and back end is ground square with working surface. Removable stop plates are furnished for back end, and one for use on either side. Working surface $2\frac{7}{16}$ " x $5\frac{1}{4}$ "; Width, incl. stop plate $2\frac{1}{16}$ "; Height $2\frac{1}{16}$ "; Length, incl. stop plate and control $6\frac{1}{4}$ ". Furnished in finished wooden case. Matched Sets furnished to order. No. 599-760 \$38.00

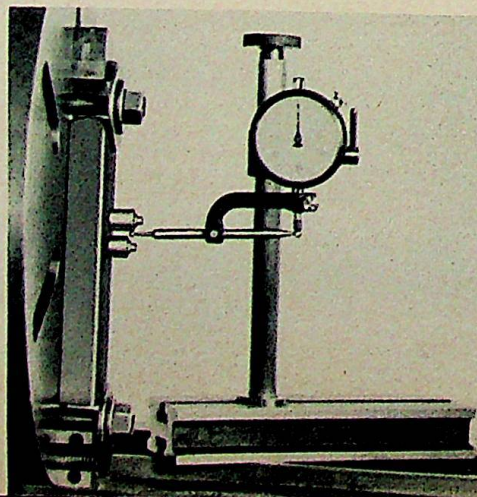
For sale only in the United States of America and its Territories.

765 Machinists' Center Punches

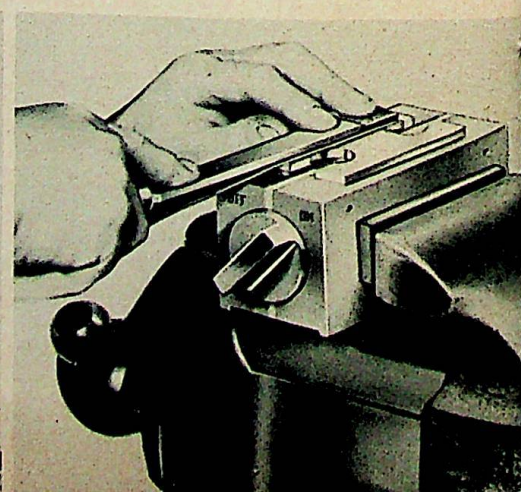
Made of tool steel selected for this type of work. Hardened with both ends tempered. About 4" long with knurled finger grip. Points ground at angle for maximum strength and penetration with a punch mark in which drills start easily.

765	$\frac{1}{16}$ " dia. top of tapered point	No. 599-765-2	\$.40
	$\frac{3}{32}$ " dia. top of tapered point	No. 599-765-3	.40

The advantage of the long Toolmakers' Button is apparent here where two buttons are placed close together in establishing hole locations.



A Permanent Magnet Block is useful not only for small machine operations, but for toolmakers' use and for holding work pieces difficult to clamp.



Make Many Hard Jobs Easier... Accuracy Surer

765 Machinists' Center Punches (Continued)

765 { $\frac{1}{8}$ " dia. top of tapered point
 $\frac{3}{16}$ " dia. top of tapered point
 $\frac{1}{2}$ " dia. top of tapered point
 Set of five in case

No. 599-765-4	\$.40
No. 599-765-5	.40
No. 599-765-7	.40
No. 599-765	2.50

770 Automatic Center Punches

Downward pressure releases striking block and makes punch marks of uniform depth. Points on Styles 2 and 3 are replaceable and integral with spindle on Style 1 but can be replaced. Style 1 is handy for carrying in the pocket. Styles 2 and 3 strike heavier blows.

770 { Style 1, $4\frac{1}{8}$ " long, $\frac{3}{8}$ " dia.	No. 599-770-1	\$3.25
Style 2, $5\frac{1}{4}$ " long, $\frac{1}{16}$ " dia.	No. 599-770-2	4.00
Style 3, 6" long, $\frac{3}{4}$ " dia.	No. 599-770-3	5.25

Extra points for Styles 2 and 3, and integral spindle and point for Style 1 can be furnished.

771 Automatic Center Punch

Adjustable. $5\frac{3}{4}$ " long, $\frac{1}{16}$ " dia. Adjustment of stroke made by turning knurled cap. Permits setting for coarse or fine work and for different materials.

No. 599-771 \$4.50

Extra points can be furnished.

775 Spacing Attachment

$5\frac{1}{8}$ " beam. Swings 8". For use with 770, Style 2 and 771 Automatic Center Punches. Useful in laying out work to be machined. Attachment replaces point on center punch. Has fine adjustment. Extension for 845-14", page 44 can be used with this attachment for large work. Furnished with straight and offset points. See, also, points listed on page 44. Extra points can be furnished.

No. 599-775 \$9.00

778 Scribes

Well made. Handles are aluminum for lightness. Points are finely tempered tool steel. Point of Style 1 is held by two-jawed chuck. It can be reversed and scriber closed to about 4" in length. Points of Styles 2 and 3 screw into knurled holders. Extra points can be furnished.

778 { Style 1	No. 599-778-1	\$.80
Style 2	No. 599-778-2	.70
Style 3	No. 599-778-3	1.00

Tungsten Carbide Point

For Style 1 Scriber. Interchangeable with regular point. Practically wear proof and permits scribing lines on glass and other hard surfaces.

No. 599-9778-12 \$2.00

790 Mercury Plumb Bobs

Solid steel, bored out and filled with mercury. Unusually heavy in proportion to size, with low center of gravity. Not easily affected by drafts. Hexagonal nut prevents rolling.

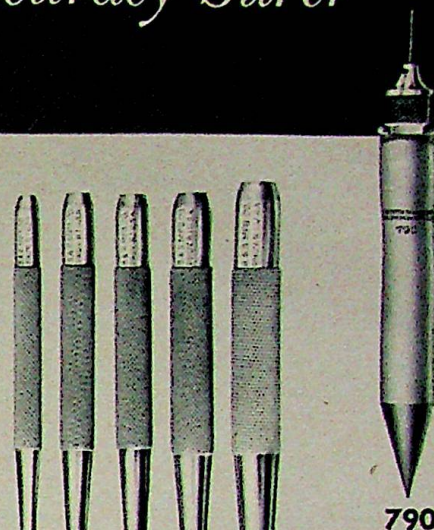
Device for holding cord is advantageous feature. Cord is locked through slot in cap which centralizes it and makes bob hang true.

Points are hardened and body and points are ground. Dull chrome plated. Furnished with braided silk line.

790 { Weight $3\frac{1}{2}$ ozs.,	Length 4", Dia. $\frac{1}{2}$ "	No. 599-790-3	\$3.90
Weight 6 ozs.,	Length $4\frac{1}{2}$ ", Dia. $\frac{5}{8}$ "	No. 599-790-6	5.20
Weight 12 ozs.,	Length $5\frac{3}{8}$ ", Dia. $\frac{7}{8}$ "	No. 599-790-12	6.40

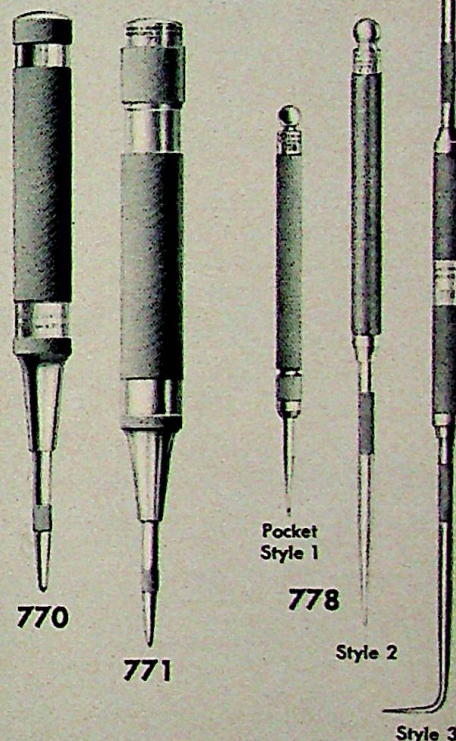
With an Automatic Center Punch, center points can be positioned accurately. Adjustable type controls point size.

Indispensable tool for scribing lines in layout work is the Scriber, as demonstrated in the illustration below.



765

790



770

771

Pocket Style 1

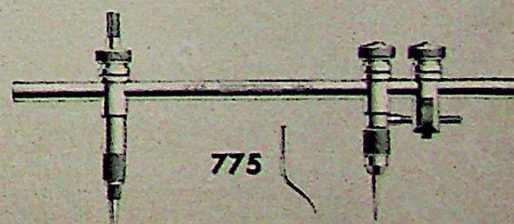
778

Style 2

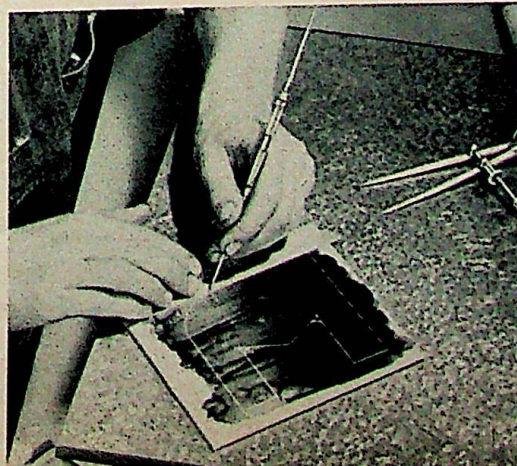
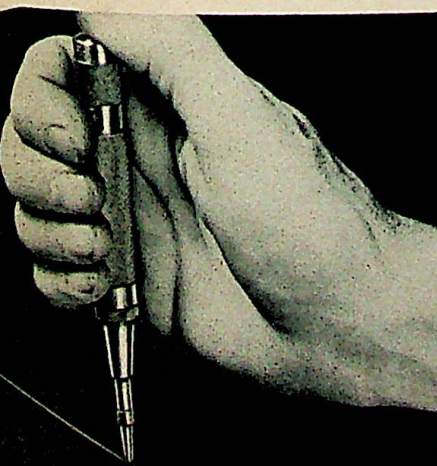
Style 3

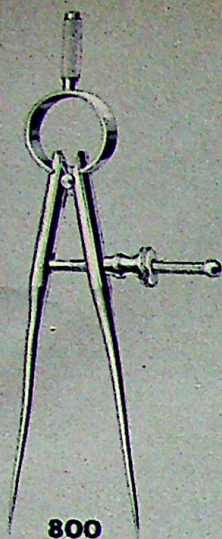


Tungsten Carbide Point for Scriber 778, Style 1

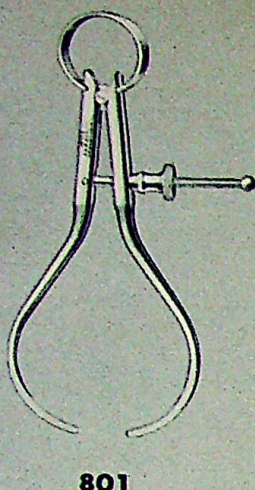


775

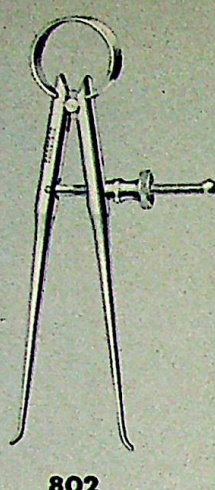




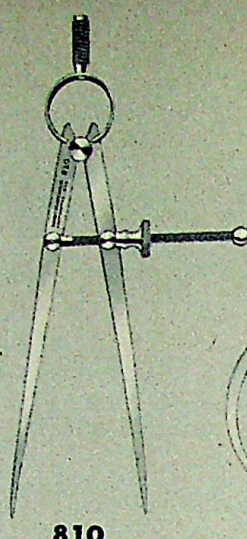
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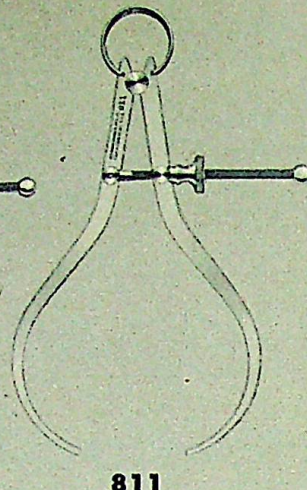
801



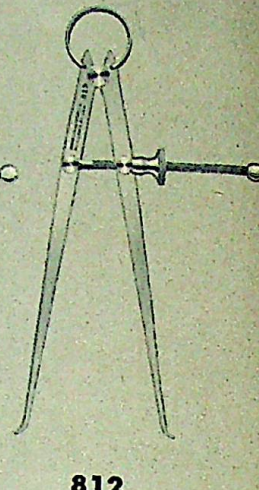
802



810

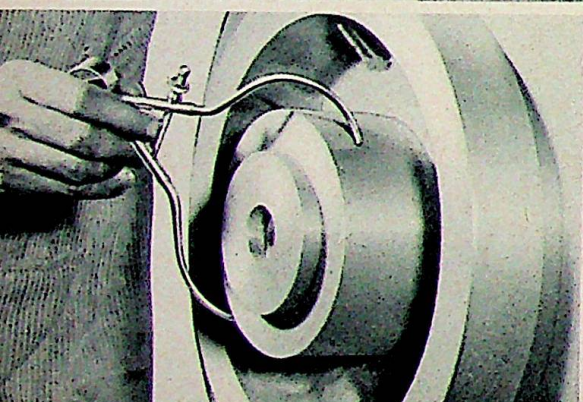
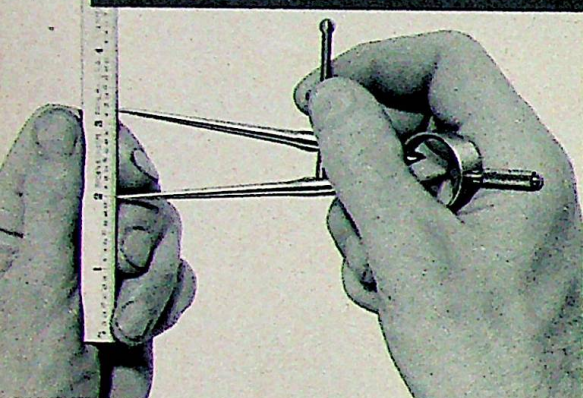


811

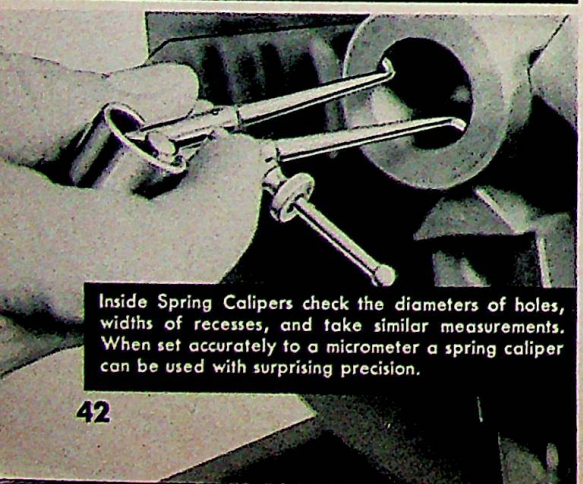


812

In setting a divider to a scale, the scale should be held firmly in one hand with the lower divider point resting in a graduation, while the other point is set for the desired measurement.



Spring Calipers should be held lightly in the fingers. With familiarity, the sense of touch can determine variances as small as a few thousandths of an inch.



Inside Spring Calipers check the diameters of holes, widths of recesses, and take similar measurements. When set accurately to a micrometer a spring caliper can be used with surprising precision.

BROWN & SHARPE

Calipers and Dividers . . .

Make deft hands More skilful

800 Toolmakers' Spring Dividers

These are finely finished, well balanced tools. The spring is strong and flexible, giving smooth, even action. The fulcrum stud has a large diameter flange preventing side deflection of the legs. The legs are of steel, round and highly polished and the measuring points come together evenly.

800	2"	No. 599-800-2	\$1.90
	3"	No. 599-800-3	2.40
	4"	No. 599-800-4	2.90
	6"	No. 599-800-6	3.30

801 Toolmakers' Outside Spring Calipers

Have same features of construction as 800. Sizes refer to length of leg; actual diametral capacity is approximately the same.

801	2"	No. 599-801-2	\$1.90
	3"	No. 599-801-3	2.40
	4"	No. 599-801-4	2.90
	6"	No. 599-801-6	3.30

802 Toolmakers' Inside Spring Calipers

Have same features of construction as 800.

802	2"	No. 599-802-2	\$1.90
	3"	No. 599-802-3	2.40
	4"	No. 599-802-4	2.90
	6"	No. 599-802-6	3.30

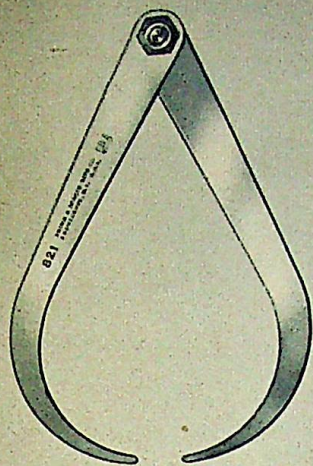
Separate Parts for Toolmakers' Spring Dividers and Spring Calipers

Various parts of these tools can be furnished separately.

810 Spring Dividers

Reliable tools of less expensive construction and finish.

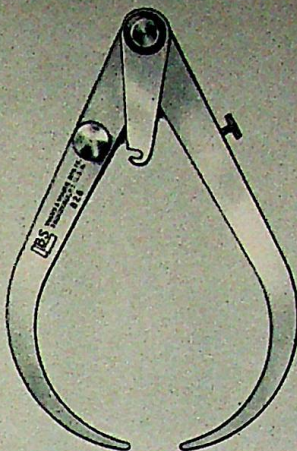
810	4"	No. 599-810-4	\$2.10
	5"	No. 599-810-5	2.20
	6"	No. 599-810-6	2.40
	8"	No. 599-810-8	2.75



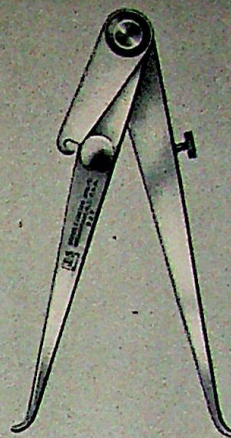
821



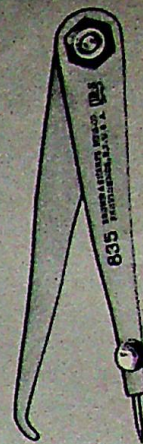
822



826



827



835

811 Outside Spring Calipers

Similar in construction to 810. Sizes refer to length of leg. Actual diametral capacity is approximately the same.

811	4"	No. 599-811-4	\$2.10
	6"	No. 599-811-6	2.40
	8"	No. 599-811-8	2.75

812 Inside Spring Calipers

Similar in construction to 810.

812	4"	No. 599-812-4	\$2.10
	6"	No. 599-812-6	2.40
	8"	No. 599-812-8	2.75

Separate Parts for 810 Spring Dividers and 811 and 812 Spring Calipers

Various parts of these tools can be furnished separately.

821 Firm-Joint Outside Calipers

Sizes refer to length of leg.

821	6" (Cap. 7" dia.)	No. 599-821-6	\$1.50
	8" (Cap. 9 1/2" dia.)	No. 599-821-8	1.90
	12" (Cap. 15" dia.)	No. 599-821-12	2.40
	18" (Cap. 22" dia.)	No. 599-821-18	4.75
	24" (Cap. 29 1/2" dia.)	No. 599-821-24	7.00

822 Firm-Joint Inside Calipers

822	6"	No. 599-822-6	\$1.50
	8"	No. 599-822-8	1.90
	12"	No. 599-822-12	2.40
	18"	No. 599-822-18	4.75
	24"	No. 599-822-24	7.00

826 Transfer Firm-Joint Outside Calipers

Sizes refer to length of leg.

826	6" (Cap. 7" dia.)	No. 599-826-6	\$3.20
	12" (Cap. 15" dia.)	No. 599-826-12	5.00
	24" (Cap. 29 1/2" dia.)	No. 599-826-24	10.00

827 Transfer Firm-Joint Inside Calipers

827	6"	No. 599-827-6	\$3.20
	12"	No. 599-827-12	5.00
	24"	No. 599-827-24	10.00

835 Firm-Joint Hermaphrodite Calipers

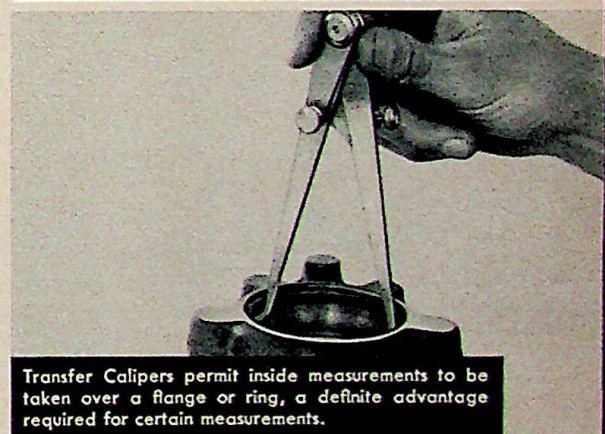
Two styles—one with adjustable point and one with solid point.

835	4" with Adj. Point	No. 599-835-4	\$2.00
	4" with Solid Point	No. 599-835-41	1.50
	6" with Adj. Point	No. 599-835-6	2.25
	6" with Solid Point	No. 599-835-61	2.00
	8" with Adj. Point	No. 599-835-8	2.50
	8" with Solid Point	No. 599-835-81	2.25

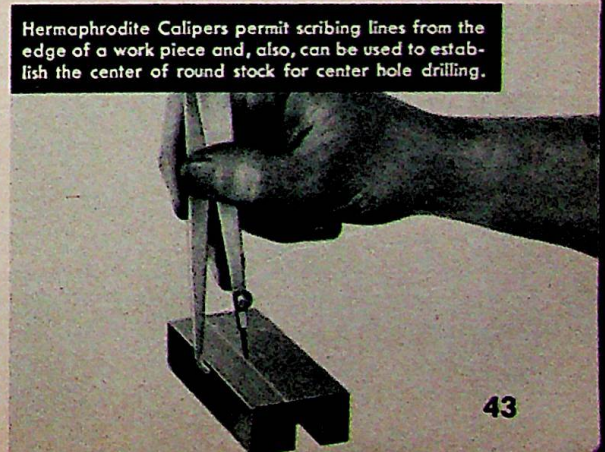
Clamp screw and nut complete, and point can be furnished separately.



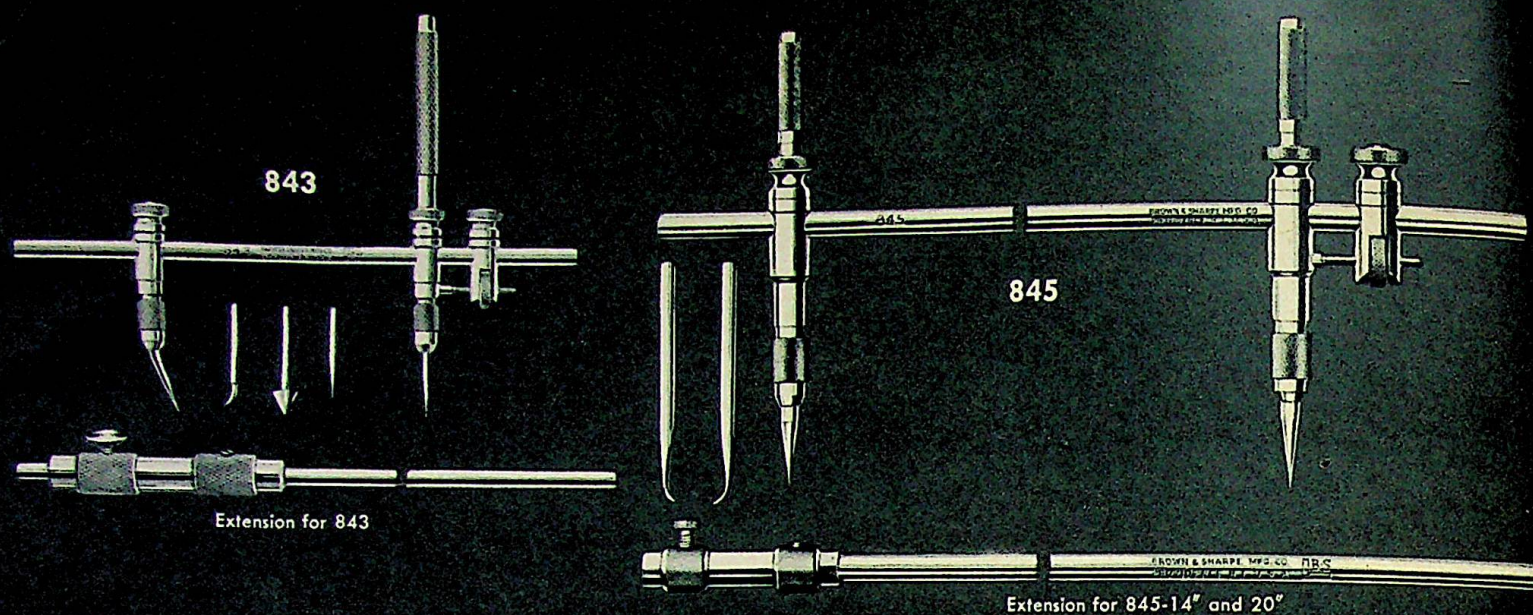
Firm-Joint Calipers are desirable where the fine adjustment of spring calipers is not required. They are adjusted by lightly tapping them against the bench.



Transfer Calipers permit inside measurements to be taken over a flange or ring, a definite advantage required for certain measurements.

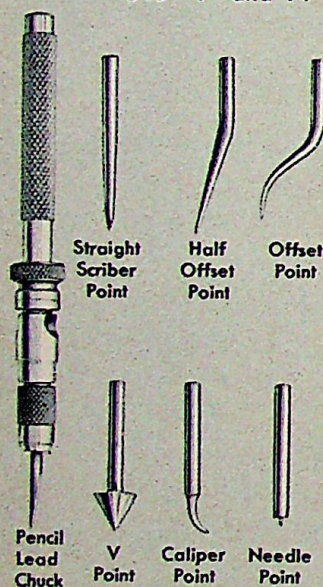


Hermaphrodite Calipers permit scribing lines from the edge of a work piece and, also, can be used to establish the center of round stock for center hole drilling.



BROWN & SHARPE DIVIDERS AND TRAMMELS

Accurately Lay Out and Transfer Distances . . . Scribe Circles



Points for 775, 843 and 845—9" and 14"

843 Universal Divider With 5 1/2" beam

Describes circle 8" in diameter. Spring friction prevents tram from sliding when loosened. One tram has fine adjustment. Easily changed points held by spring chucks. Furnished with 2 straight points, half offset point, V point (centers in holes to 1/4" diameter), and caliper point.

No. 599-843 \$10.00
Finished Wooden Case No. 599-843-9999 2.00

Extension for 843

With extension, divider describes circle 37" in diameter. Includes coupling.

No. 599-9845-1422 \$2.50

845 Steel Beam Trammels With 9" beam, 7/32" dia. Describes circle 18" in diameter. With 14" beam, 1 1/4" dia. Describes circle 26" in diameter. With 20" beam, 1 1/2" dia. Describes circle 36" in diameter. Two straight scriber points and two caliper points furnished.

With 9" beam No. 599-845-9 \$8.00 With 20" beam No. 599-845-20 \$10.40
With 14" beam No. 599-845-14 9.00 Finished Wooden Case No. 599-845-9999 5.75
Finished Wooden Case for 14" No. 599-845-9998 \$3.50

Extension for 14"

Describes circle 54" in diameter. Can be used with Spacing Attachment 775.

No. 599-9845-1422 \$2.30

Extension for 20" Describes circle 72" in diameter.

No. 599-9845-2022 2.30

Points for 775, 843 and 845—9" and 14"

Straight Scriber Point No. 599-9843-28 \$.35 V Point (centers in holes to 1/4" dia.) No. 599-9843-26 \$.60
Half Offset Point No. 599-9843-24 .50 Caliper Point No. 599-9843-23 .50
Offset Point No. 599-9775-25 .50 Needle Point No. 599-9845-1427 .50

Pencil Lead Chuck (for 845—14") Takes lead .075" in dia.

No. 599-9845-1421 \$1.20

Points for 845—20"

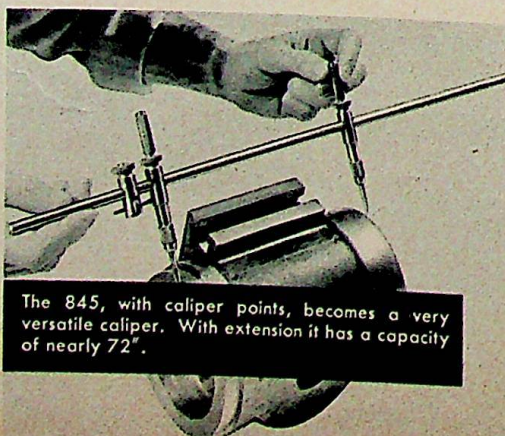
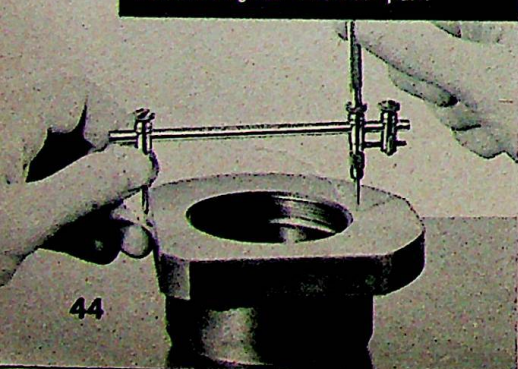
V points (pair) center in holes from 1/4" to 1 5/8" dia. No. 599-9845-2026 \$4.50
Needle Point No. 599-9845-2027 1.15

Caliper Point No. 599-9845-2023 \$.50
Straight Scriber Point No. 599-9845-2028 .50

Pencil Lead Chuck (for 845—20") Needle point furnished.

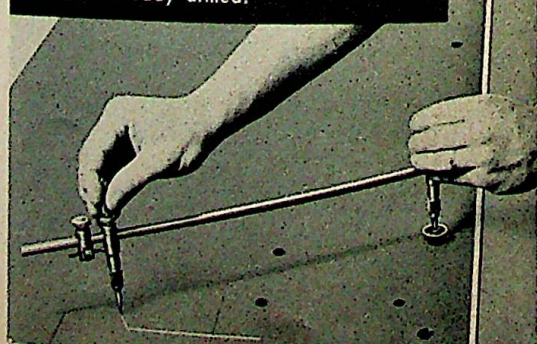
No. 599-9845-2021 \$3.50

With the caliper point a Universal Divider can scribe an arc or establish distances from the edge of a machine part.



The 845, with caliper points, becomes a very versatile caliper. With extension it has a capacity of nearly 72".

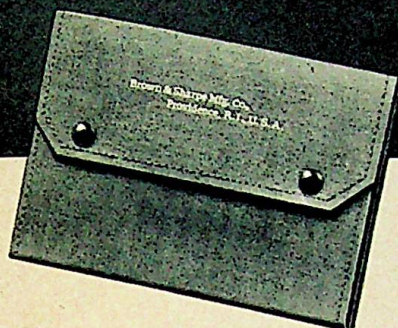
The V point with steel beam trammel 845 permits scribing distances from precise center of holes already drilled.



BROWN & SHARPE

SETS OF STANDARD TOOLS...

*The Sets Beginners
Use A Lifetime*



847

847 Set of Standard Tools

For students and apprentices—essential equipment for the beginner. Neatly arranged in folding leatherette case. Size folded, 7" x 4 3/4" x 1 3/8". Contains the following tools—300-6", 402-6", 650, 765-1/8", 810-4", 811-4", 812-4" and 835-4".

No. 599-847 \$20.00

848 Set of Standard Tools

For students and apprentices. A modest set of fine quality, frequently used tools including a 1" micrometer. Neatly arranged in folding leatherette case. Size when folded, 9 1/4" x 7" x 1 1/2". Contains the following tools—11, 306A, 402-9", 650, 765-3/16", 800-4", 801-4", 802-4" and 835-4".

No. 599-848 \$38.50

849 Set of Standard Tools

For students and apprentices. Furnished in finished wooden case. Contains the following tools—300-6", 402-6", 650, 765-1/8", 810-5", 811-6", 812-6" and Brown & Sharpe Handbook.

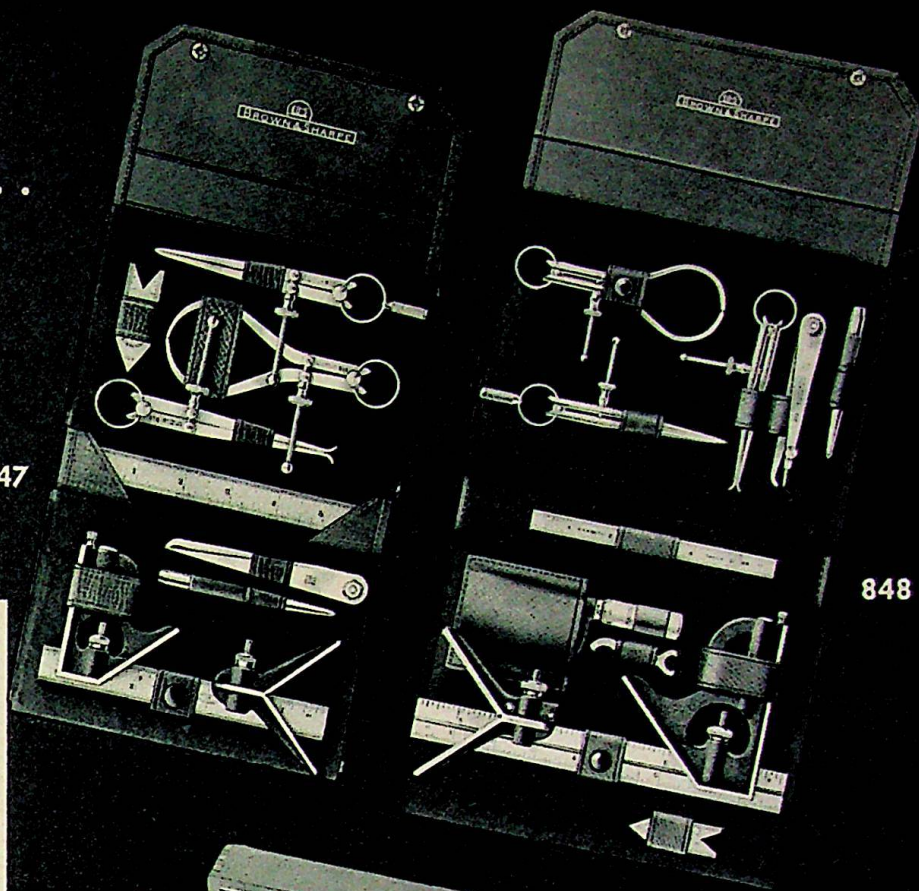
No. 599-849 \$21.50

Brown & Sharpe Handbook

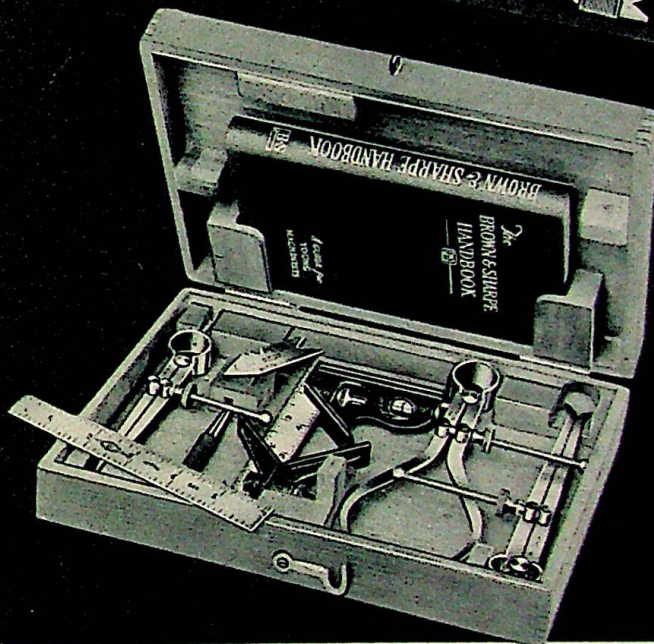
Contains many useful hints and instructions on machine shop practice. Leatherette cover. 317 pages.

No. 783-1-1 \$1.25

The apprentice finds constant use for the tools in his Set 849 and the Handbook in the Set helps him in learning how to use them.



848



849

The Outside Spring Caliper in his kit 847 is being used by an apprentice to check the size of the turned part in a lathe.

The tools in Set 848, which includes the micrometer, provide for an even wider range of work for the apprentice than Sets 847 and 849.

